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United States  
Department of  
Agriculture

Forest Service

Tongass National Forest

R10-MB-452

December 2002



# Licking Creek Timber Sale

## Draft Environmental Impact Statement









File Code: 1950

Date: October 28, 2002

Dear Reviewer:

Enclosed is the Draft Environmental Impact Statement (Draft EIS) for the Licking Creek Timber Sale on the Ketchikan-Misty Fiords Ranger District, Tongass National Forest. The entire Draft EIS is included in one document, which describes one no-action alternative and four action alternatives ranging from 10,709 to 33,556 CCF (5.4 to 16.8 MMBF) of harvest. Proposed harvest methods include even-aged and uneven-aged management. My preferred alternative is Alternative 4, which emphasizes positive timber sale economics.

The comment period on the Draft EIS must be a minimum of 45 days from the date of publication of the notice of availability in the Federal Register, anticipated to be December 06, 2002. In order to ensure that filing, printing and mailing timelines incorporate this minimum period, the deadline for comments will be January 21, 2003.

Federal court decisions have established that reviewers of a Draft EIS must structure their participation so that it is meaningful and alerts an agency to the reviewer's position and contentions. Environmental objections that could have been raised at the Draft stage may be waived if not raised until after completion of the Final EIS. This is so substantive comments and objections are made available to the Forest Service at a time when they can be evaluated and addressed in the Final EIS.

A public meeting will be scheduled during the comment period. The date and location for this meeting will be published in the Ketchikan Daily News. You are encouraged to review and comment on the Draft EIS and participate in the public meeting. Please send written comments to:

Jerry Ingersoll, District Ranger  
Attn: Licking Creek  
3031 Tongass Ave.  
Ketchikan, AK 99901

Written comments may also be faxed to 907-225-8738. Your input will be used to prepare the Final EIS and Record of Decision. If you have questions please contact Kathy O'Connor at (907) 228-4124 (e-mail [ksoconnor@fs.fed.us](mailto:ksoconnor@fs.fed.us)). Your interest in the management of the Tongass National Forest is appreciated.

Sincerely,

THOMAS PUCHLERZ  
Forest Supervisor





# Licking Creek Timber Sale

## Draft Environmental Impact Statement

United States Department of Agriculture  
Forest Service Alaska Region

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Tongass National Forest

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### Abstract

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The USDA Forest Service proposes to harvest up to approximately 33,556 CCF (16.8 MMBF) of timber in the Licking Creek project area, Ketchikan-Misty Fiords Ranger District, Tongass National Forest. The actions analyzed in this Draft Environmental Impact Statement (EIS) are designed to implement direction contained in the Tongass Land Management Plan (Forest Plan). The Draft EIS describes five alternatives which provide different combinations of resource outputs and spatial locations of harvest units. The alternatives include: 1) No Action, proposing no new harvest from the project area at this time; 2) minimize potential effects to wildlife, watersheds, and scenery, while providing 10,709 CCF (5.4 MMBF) of timber harvest; 3) locate units to minimize harvest on critical deer winter range and wildlife habitats, harvest 23,832 CCF (11.9 MMBF) of timber; 4) Preferred Alternative, configure harvest units to emphasize timber sale economics, harvest 33,556 CCF (16.8 MMBF) of timber; and 5) build no new roads on the project area, while providing 32,261 CCF (16.1 MMBF) of timber harvest.

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# Summary



# Summary

## Purpose and Need for Action

The Forest Service has prepared a Draft Environmental Impact Statement (EIS) on the effects of a proposed timber sale in the Licking Creek project area of the Ketchikan-Misty Fiords Ranger District, Tongass National Forest (Figure S-1). The sale would be offered in 2003.

The Licking Creek project area is northeast of the community of Ketchikan in the southeast corner of Alaska (Figure S-1). It is located on Revillagigedo (Revilla) Island, on the eastern shore of Carroll Inlet. Currently, it is accessible only by water or air. National Forest System lands encompass the majority of the 14,424-acre project area, with a small private holding in the southern portion. Cape Fox Corporation holds industrial timberlands outside of the project area, on the southwestern portion of Carroll Inlet and nearby George Inlet.

Our initial proposal was to contract for harvest approximately 19 million board feet (MMBF) of timber from 900 acres of National Forest System land, and construct approximately 5 miles of new road. The timber would be transported to an existing log transfer facility at Shoal Cove. This became Alternative 4 in our environmental analysis, and is the Preferred Alternative. Under this alternative, we propose to harvest approximately 16.8 MMBF of timber from 790 acres, and construct approximately 5.5 miles of new road.

The proposed timber harvest is intended to move the project area toward desired conditions, as they were identified in the 1997 Tongass Land and Resource Management Plan (Forest Plan). The Forest Plan allocated National Forest System lands to land use designations (LUDs), and identified Goals, Standards and Guidelines, and Management Prescriptions for these LUDs. We achieve the desired conditions by applying these prescriptions on the landscape.

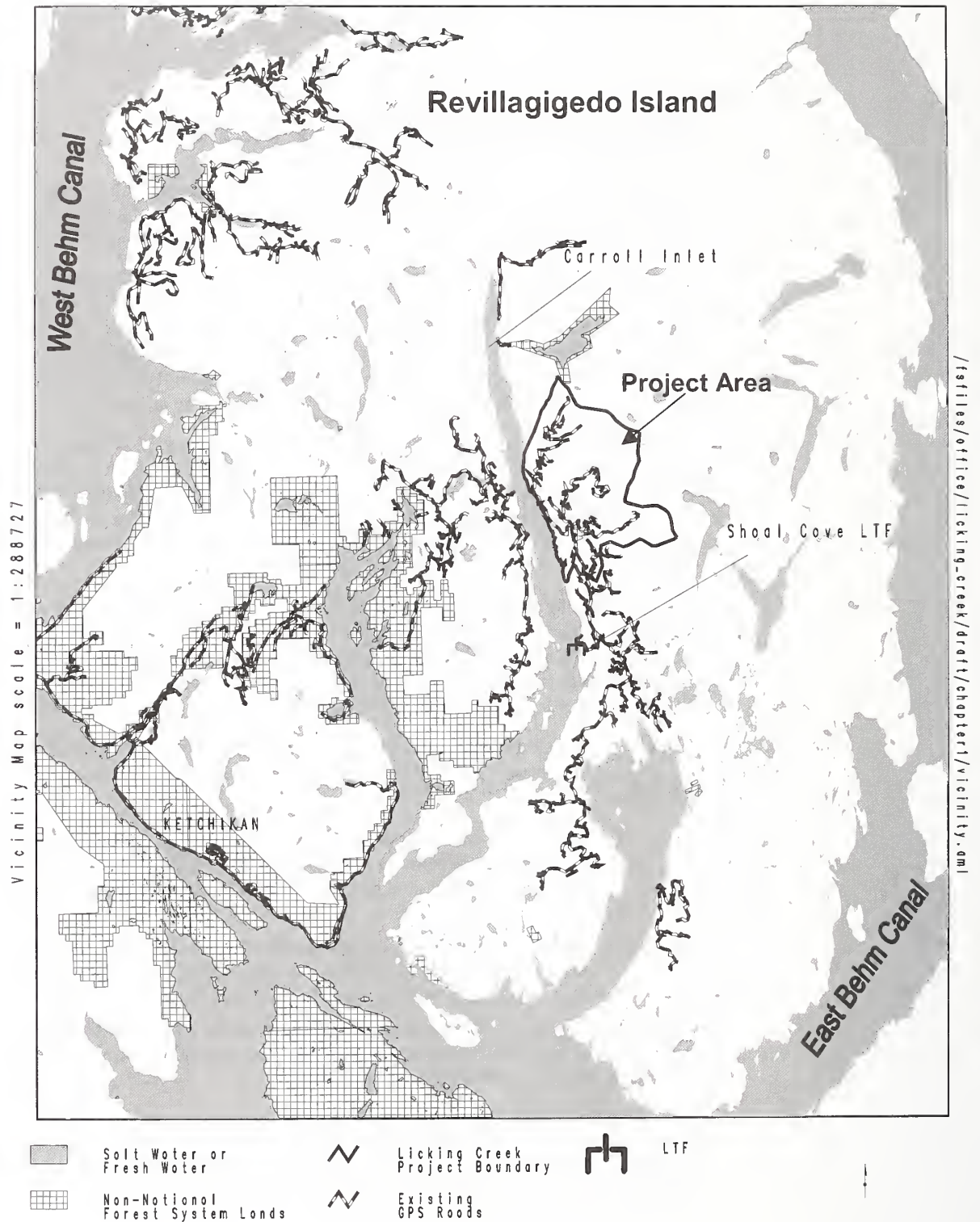
The Licking Creek project area is allocated to Timber Production (79 percent), Modified Landscape (19 percent), Old Growth Habitat (<1 percent), and Semi-Remote Recreation (<1 percent) LUDs.

- The desired condition for the **Timber Production LUD** is to manage lands for the production of sawtimber and other wood products. This is to help meet market demand for timber, and provide resource production opportunities and employment for local communities.
- The desired condition for the **Modified Landscape LUD** is to provide a sustained yield of timber and a mix of resource activities. Management activities dominate the background, and scenic quality is emphasized in the foreground.

Forest Plan Standards and Guidelines for other resources, such as wildlife habitat, scenery, heritage resources, soils, water quality and fisheries, are applied to minimize the adverse impacts of timber harvest on these resources.

Following Forest Plan Standards and Guidelines, no timber harvest or road construction is proposed within the **Old-growth Habitat** or the **Semi-Remote Recreation LUDs** under any alternative. No timber harvest or road construction is proposed within any Inventoried Roadless Areas.

Figure S-1  
Licking Creek Vicinity Map



## Issues and Concerns

Issues and concerns for the Licking Creek project were gathered through public and internal scoping. We identified four key issues, which are addressed through the design of the Proposed Action and alternatives. See "Effects of the Alternatives" in this chapter.

### **Issue 1: Timber Economics**

There is a concern about the economic viability of timber sales, and how the timber industry contributes to the overall economic health of the Ketchikan area and Southeast Alaska.

### **Issue 2: Wildlife Habitat**

There is a concern that the cumulative effects of past, present and proposed timber harvest may reduce habitat for deer and other wildlife. This may lead to reductions in deer and wolf populations, and may affect opportunities to hunt deer in the project area.

### **Issue 3: Watersheds and Fish Habitat**

There is a concern that the cumulative effects of past, present and proposed timber harvest may impact water quality and fish habitat in the project area.

### **Issue 4: Transportation**

There is a concern that the addition of new roads to our open road system may exceed our current and future capability for road maintenance.

## Other Concerns

Additional concerns were considered and determined not be key issues for this project. These were addressed through project design, mitigation, or application of Forest Plan Standards and Guidelines.

### **Karst**

A band of karst, with sensitive features such as caves and sinkholes, runs across the project area. Mitigation measures were included in all alternatives, and all proposed harvest units and access road segments were modified to exclude high-vulnerability karst.

### **Scenery**

The possibility of cumulative effects of past timber harvest and additional harvest not meeting Forest Plan Standards and Guidelines for Scenery was raised as an internal concern. Timber harvest units were modified during planning and alternative development to minimize impacts on scenery.

### **Subsistence**

For all subsistence resources, including deer, it is not expected that project-related or reasonably foreseeable future activities would cause a significant possibility of a significant restriction on subsistence use in the project area.

All action alternatives incorporate and apply Forest Plan Standards and Guidelines for riparian areas, the beach and estuary fringe, and goshawk and marten habitats. No timber harvest would occur in riparian or beach and estuary fringe habitats in any alternative.

## Project Alternatives

The Proposed Action (Alternative 4) and four other alternatives are considered in detail in the Draft EIS. Alternative 1 is the No-action Alternative; if we select this alternative, we would forego timber harvest in the project area at this time. The actions proposed for each alternative are displayed below. They represent different ways to satisfy the Purpose and Need and to respond to the issues and concerns that were identified by the public and internally.

Table 1-1  
Harvest Objectives and Practices of the Alternatives

Category	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Silvicultural Systems (acres)</b>					
Even-aged	0	253	551	784	737
Uneven-aged	0	0	22	6	28
<b>Total Acres</b>	<b>0</b>	<b>253</b>	<b>573</b>	<b>790</b>	<b>765</b>
<b>Harvest Systems (CCF)</b>					
Cable	0	5,293	12,537	22,964	8,421
Shovel	0	303	711	4,392	642
Helicopter	0	5,113	10,584	6,200	23,198
<b>Harvest Volume <sup>1/</sup></b>		5.4	11.9	16.8	16.1
<b>[MMBF (CCF)] <sup>2/</sup></b>	<b>0</b>	<b>10,709</b>	<b>23,832</b>	<b>33,556</b>	<b>32,261</b>
<b>Roads (miles)</b>					
New construction--classified	0	0.67	1.06	3.13	0
New construction--temporary	0	0.83	1.11	2.36	0
<b>Total New Road Miles</b>	<b>0</b>	<b>1.50</b>	<b>2.17</b>	<b>5.49</b>	<b>0</b>
Reconstruction	0	4.11	4.11	1.65	4.11

<sup>1/</sup> Excluding right-of-way volume

<sup>2/</sup> MBBF = 1000 board feet; CCF = 100 cubic feet

Source: D. Fletcher, 2002

**Alternative 4 (the Proposed Action and Preferred Alternative)** was designed to emphasize timber economics. **Alternative 3** was designed to minimize adverse effects on critical winter habitat for deer. **Alternative 2** was designed to minimize adverse effects on wildlife habitat and watersheds, while providing for some timber harvest. **Alternative 5** was designed to harvest timber without building any new roads.



## Effects of the Alternatives

The effects of the alternatives on the resource issues and concerns are summarized below. For a full understanding of the environmental effects, Chapter 3 of the Draft EIS should also be read.

Table S-2  
Comparison of Alternatives by Issue

Issues	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b><u>Issue 1: Timber Economics</u></b>					
Average harvest cost <sup>1/</sup> (\$/CCF)	0	171.47	155.08	130.64	162.78
Direct income generated (millions \$)	0	1.26	2.80	3.95	3.80
Direct job years created <sup>2/</sup>	0	28	63	89	85
<b><u>Issue 2: Wildlife Habitats</u> <sup>3/</sup></b>					
Reduction in potential deer habitat from existing conditions <sup>3/</sup>	0	2%	4%	8%	5%
Cumulative reduction in potential deer habitat since 1954 <sup>3/</sup>	33%	34%	36%	39%	36%
Reduction in marten high-value habitat capability <sup>3/</sup> (from existing)	0	4%	11%	14%	15%
Post-harvest open road density (marten habitat recommended level: 0.2 mi./ sq.mi.)--VCU 7460	0.8	0.8	0.8	0.8	0.8
Post-harvest open road density (wolf habitat recommended level: 0.7 mi./ sq.mi.)—WAA 406	0.3	0.3	0.3	0.3	0.3
<b><u>Issue 3: Watersheds &amp; Fish Habitat</u></b>					
Class II stream crossings (reconstructed) <sup>4/</sup> (2 bridges, 1 culvert)	0	3	3	3	3
Class III stream crossings (new) <sup>4/</sup>	0	0	1	2	0
Class IV stream crossings (new) <sup>4/</sup>	0	0	0	2	0
<b><u>Issue 4: Transportation</u></b>					
Estimated cost of road construction and maintenance (\$)	0	553,100	660,150	1,078,900	326,000
Possible significant effects from roads on soils and water quality	No	No	No	No	No

1/ For optional removal of utility logs.

2/ Based on 5.28 direct jobs per MMBF; job year/harvest ratio from Forest Plan

3/ Wildlife effects are reported for the project area, unless otherwise noted.

4/ All new and reconstructed stream crossings would meet standards to provide fish passage.

Source: K. O'Connor, 2002

### **Issue 1: Timber Economics**

Alternative 1 proposes no timber harvest, and thus offers no opportunity for timber-related employment or personal income. The action alternatives would result in timber-related employment opportunities in proportion to their total harvest volumes. Alternative 4 offers the most timber volume and generates the highest potential number of jobs. It is also the most economically efficient. Alternative 5 offers the second-highest timber volume and generates the second-highest number of jobs, but is economically inefficient due to a high percentage of helicopter harvest. Alternative 3 offers the third-highest timber volume and generates the third-highest number of jobs. Alternative 2 offers the least timber volume and generates the fewest jobs. These last two alternatives are intermediate in economic efficiency.

### **Issue 2: Wildlife Habitat**

Deer habitat capability is currently above the minimum recommended density to maintain wolf populations in the project area, and this condition would continue under all action alternatives. The number of deer would remain adequate to sustain expected hunting levels and subsistence use. The action alternatives would reduce the deer habitat capability, with the effect proportional to the proposed harvest. Alternative 2 would have the least effect, Alternative 3 a larger effect, Alternative 5 an even larger effect, and Alternative 4 the greatest effect. For all

action alternatives, post-harvest open road densities would be within the recommended levels for wolves, but above the recommended maximum densities for marten. However, these open roads are not connected to any communities and motor vehicle traffic is light, and the road densities should not adversely affect marten. After harvest activities are completed, all new project roads would be closed.

### **Issue 3: Watersheds and Fish Habitat**

Anadromous fish (salmon) habitat within the Licking Creek project area is minimal, and the project area watersheds are, generally, unproductive for these species. With the application of Forest Plan Standards and Guidelines, including those for riparian areas, risks to freshwater and marine resources and Essential Fish Habitat would be minimized, and no significant adverse effects are anticipated to occur. Recreational fishing access would be unaffected, as all new roads would be closed after timber harvest and associated silvicultural activities. Of the action alternatives, Alternative 4 would have the greatest potential effect on fish and water resources, followed by Alternative 5, Alternative 3, and Alternative 2. No new stream crossings are proposed on Class I or II streams under any of the action alternatives. Three existing Class II crossings would be reconstructed (two bridges and one culvert) under all action alternatives.

### **Issue 4: Transportation**

Forest Plan Standards and Guidelines and Best Management Practices (BMPs) would be applied to all road construction activities for all alternatives. New roads planned for Alternatives 2, 3, and 4 would be located to minimize crossing of karst features, wetlands, and slopes and soils at high risk for mass movement. Application of mitigation and BMP measures would minimize erosion of road surfaces, and new stream crossings would be designed to minimize sediment delivery to streams. In order to obtain an affordable road system with all roads properly maintained, the majority of roads (and all new roads) would be closed after completion of timber harvest and silvicultural activities. No new roads are planned for Alternative 5. No new roads or other activities are proposed within any inventoried roadless areas.

## **Other Concerns**

### **Karst**

Substantial karst mineral deposits were found in the project area during field reconnaissance, including some highly vulnerable features such as caves and sinkholes. All timber harvest and road construction proposed for the action alternatives was designed to meet Forest Plan Standards and Guidelines for management of karst resources, and avoid high-vulnerability karst and cave features.

### **Scenery**

Timber harvest units were designed during planning and alternative development to minimize impacts on scenery. Under Alternative 2, only two harvest units would be visible from viewpoints along Carroll Inlet. Portions of five harvest units would be visible under Alternative 3, and nine harvest units under Alternatives 4 and 5. With one exception (discussed below), all timber harvest proposed for the action alternatives would meet the Visual Quality Objectives for the project area.

Conditions between Calamity Creek and Marble Creek currently meet the visual quality objectives for this viewshed. However, the harvest of one unit currently under contract will not meet the visual quality objectives in this area. No timber harvest in this viewshed is proposed under Alternative 2. Timber harvest proposed in Alternatives 3 and 4 would increase the total harvest in this viewshed, but would not substantially add to the impacts created by the existing harvest and the planned harvest unit.

### **Subsistence**

The project area is not within a high-use subsistence area, and no significant concerns about subsistence resources and uses were identified during public scoping or consultation with tribal governments. Most deer hunting in the project area is by Ketchikan (non-rural) residents, and subsistence use is very light. The proposed timber harvest, for all alternatives, would reduce current deer habitat capability within WAA 406 by only 1 percent. Deer hunting demand, for both subsistence use and non-subsistence hunting, is expected to remain below 10 percent of

the habitat capability, which is sustainable. For all subsistence resources, it is not expected that project-related or reasonably foreseeable future activities would cause a significant possibility of a significant restriction on subsistence resources or use in the project area.





Skunk cabbage and muskeg; photo by Sheila Spores

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# **Chapter 1**

## **Purpose and Need**





# Chapter 1

## Purpose and Need

### Introduction

This Draft Environmental Impact Statement (EIS) was prepared by the Ketchikan-Misty Fiords Ranger District office of the Tongass National Forest to document our analysis of a proposed timber sale within the Licking Creek project area.

This Draft EIS states the Purpose and Need for, and outlines the effects of, alternatives to the proposed Licking Creek Timber Sale. We describe Alternative 1 (“No Action”), Alternative 4 (“Proposed Action”), and three other alternatives for harvesting timber. The action alternatives include building and maintaining roads and maintaining a log transfer facility (LTF). No timber harvest or other activity is proposed within any roadless areas. This document discloses the direct, indirect, and cumulative environmental effects, and any irreversible or irretrievable commitment of resources that would result from the Proposed Action or alternatives.

This Draft EIS was prepared according to the format established by the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1500-1508). In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental effects of the alternatives and how adverse effects may be mitigated.

**Chapter 1** explains the Purpose and Need for the Proposed Action and the public issues surrounding the action. In this chapter, we discuss how the Licking Creek Timber Sale relates to the Tongass Land and Resource Management Plan (Forest Plan) and other legal and administrative obligations.

**Chapter 2** describes and compares the alternatives to the Proposed Action. We summarize the environmental effects, implementation, and mitigation that would occur with each of the alternatives. We also present specifically required disclosures related to the legal and administrative framework described in Chapter 1.

**Chapter 3** describes the existing environment and the issues associated with this project. It predicts the environmental effects likely to occur with implementation of the alternatives. These effects include both direct and indirect impacts of each alternative on the human and natural environments, as described for each resource issue. We also disclose the potential cumulative impacts of past, present, and reasonably foreseeable future actions.

**Chapter 4** contains the list of preparers, distribution list, glossary, literature cited, and an index. The glossary will be especially useful to reviewers unfamiliar with technical terms or some of the more relevant laws regarding the resource analyses.

**Appendices** provide supporting information on units, roads, and visual effects. Appendix A describes how the Licking Creek Timber Sale fits into the overall timber program for the Tongass National Forest. Additional documentation may be found in the project planning record located in the Ketchikan-Misty Fiords Ranger District office in Ketchikan, Alaska.

### Document Organization

# 1 Purpose and Need

## Forest Plan Goals and Objectives

## Purpose and Need

The Licking Creek Timber Sale is proposed to respond to goals and objectives of the Forest Plan, and to help move the project area towards desired future conditions described in that plan.

The Forest Plan identified the following goals and objectives:

- Manage the timber resource for production of saw timber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner (Forest Plan, page 2-4).
- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber, and the market demand for the planning cycle (Forest Plan, page 2-4).
- Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska (Forest Plan, page 2-3).
- Support a wide range of natural resource employment opportunities within Southeast Alaska's communities (Forest Plan, page 2-3).

## Proposed Action

We defined a "Proposed Action" early in the planning process. This served as a starting point for the interdisciplinary team, and gave the public and other agencies specific information on which to focus comments. We then developed alternatives to the Proposed Action, to respond to environmental issues, public concerns, and comments from other agencies. This process is discussed in detail in Chapter 2. The Proposed Action may become, but does not necessarily have to be, the "preferred" or final "selected" alternative.

Alternative 4 corresponds to the Forest Service's initial Proposed Action. The original Proposed Action identified approximately 39,851 CCF (19.9 MMBF) to be harvested from 899 acres. The Proposed Action was later refined to approximately 33,556 CCF (16.8 MMBF) to be harvested from 790 acres. (See the Alternative 4 map and a complete description of Alternative 4 in Chapter 2.) Approximately 5.5 miles of new road would be constructed and 4.1 miles of existing road would be repaired. Logs would be transported to an existing log transfer facility at Shoal Cove.

## Decisions to Be Made

The Record of Decision (ROD) for the Forest Plan established that timber harvest is appropriate in the Licking Creek project area. Based on the environmental analysis in the Final EIS for the project, the Tongass Forest Supervisor will decide if, where and how to make timber available from the Licking Creek Timber Sale. This will include:

- The location, design, and scheduling of timber harvest, road construction, log transfer facilities, and silvicultural practices,
- Access management measures (road, trail, and area restrictions and closures associated with the timber sale project), and
- Mitigation measures and monitoring requirements.

## Project Area

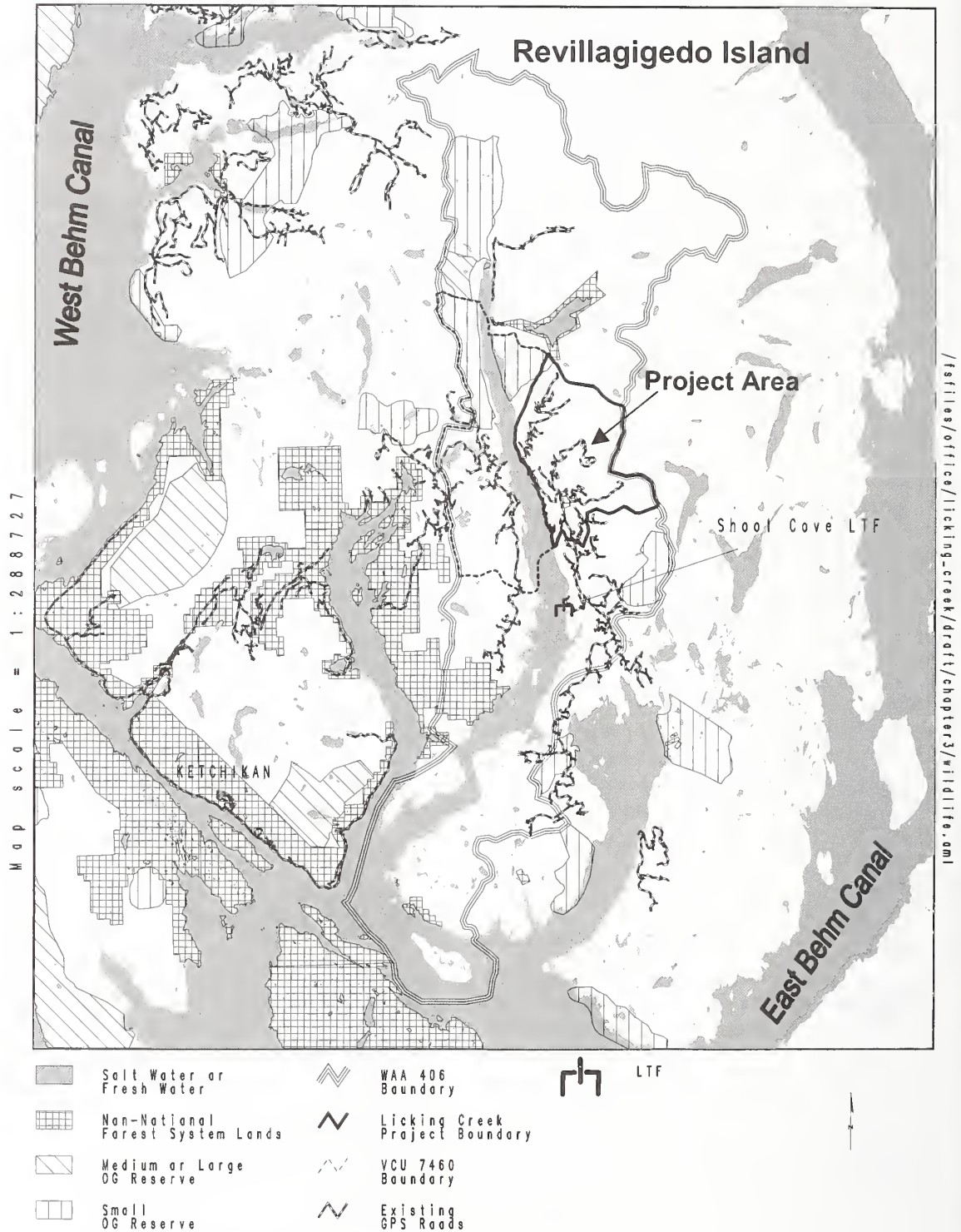
The Licking Creek project area is northeast of the communities of Ketchikan, Saxman and Metlakatla in the southeast corner of Alaska. It is located on Revillagigedo (Revilla) Island, and occupies approximately 14,424 land acres on the eastern shore of Carroll Inlet. Currently, it is accessible only by water or air. National Forest System lands encompass the majority of the project area, with a small private holding in the southern portion. Cape Fox Corporation holds industrial timberlands well outside of the project area, to the southwest across Carroll Inlet. The vicinity map (Figure 1-1) shows the location of the project area and other land ownerships in the area.

The project area is within Value Comparison Unit (VCU) 7460. VCUs are similar in size to large watersheds in Southeast Alaska (5,000 to 10,000 acres), and generally follow major watershed divides. VCU 7460 is delineated on the vicinity map (Figure 1-1).

The Licking Creek project area is also within Wildlife Analysis Area (WAA) 406. WAAs are Forest Service land divisions that correspond to the “Minor Harvest Areas” used by the Alaska Department of Fish and Game. This geographic area is used for the wildlife and subsistence analyses in Chapter 3, and is also displayed on the vicinity map (Figure 1-1).

# 1 Purpose and Need

Figure 1-1  
Project Area Vicinity Map Including Other Ownerships



Source: J. Llanos, GIS, 2002



## Relationship to the Tongass Land and Resource Management Plan

Forest planning takes place at national, regional, forest, and project levels. The Forest Plan is a forest-level analysis. It embodies the provisions of the National Forest Management Act and its implementing regulations, and other guiding documents, and sets forth in detail the direction for managing the land and resources of the Tongass National Forest. The Forest Plan was developed through extensive analysis, which is described in the Forest Plan Final EIS and the 1997 Record of Decision.

The Licking Creek Timber Sale Draft EIS is a project-level analysis; its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels. It does, however, implement direction provided at those higher levels. Where appropriate, the Licking Creek Timber Sale Draft EIS tiers to the Forest Plan EIS, as encouraged by 40 CFR 1502.20.

### Relationship to the Draft SEIS for Wilderness Recommendations

In *Sierra Club v. Lyons (J00-0009CV(JKS))*, the US District Court, District of Alaska directed the Forest Service to prepare a supplemental environmental impact statement (SEIS) that evaluates and considers roadless areas within the Tongass for recommendation as potential wilderness areas. On April 26, 2002 the Court enjoined the Forest Service from permitting timber harvest and road building in roadless areas until forty-five days after publication of the final SEIS. The Forest Service released the Draft SEIS in May 2002, and hopes to complete the Final SEIS and Record of Decision in Winter 2002-2003.

The roadless inventory that was prepared for the 1997 Forest Plan revision is being updated to support the SEIS. The draft Inventoried Roadless Areas, as shown in the Alternative 1 map for the Draft SEIS (2002), include the most current land ownership information, new developments (roads, timber harvest) implemented since the previous inventory, and a more refined roadless area mapping process to consistently represent unroaded areas across the Forest.

The Licking Creek project does not propose any timber harvest or road construction in Inventoried Roadless Areas, as mapped for the 1997 Forest Plan and 2002 Draft SEIS. (This is discussed in the Roadless Area section in Chapter 3.)

### Forest Plan Land Use Designations

The Forest Plan uses land use designations (LUDs) to guide management of the National Forest System lands within the Tongass. Each LUD provides for a unique combination of activities, practices and uses. Goals, objectives, and desired future conditions for each LUD that occurs within the Licking Creek project area are included or summarized below, and the LUD locations are shown in the Alternative 1 Land Use Designations map at the end of Chapter 2. Chapter 3 of the Forest Plan contains a detailed description of each land use designation.

#### Timber Production

Approximately 79 percent of the lands in the Licking Creek project area have a land use designation (LUD) of Timber Production. Most of the proposed harvest units and road construction are within this LUD. The goals of this designation are to:

- maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs,
- manage these lands for sustained long-term timber yields, and
- seek to provide a supply of timber from the Tongass National Forest which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this land use designation.

# 1 Purpose and Need

For Timber Production, the desired future condition includes a sustained yield of timber, healthy tree stands in a balanced mix of age classes from young stands to trees of harvestable age, and a road system providing access for timber management as well as recreation, hunting and fishing, and other public uses. Recreation opportunities associated with roaded settings are available. The desired future condition is that some suitable and available timber stands will be in the early and middle successional stages.

## **Modified Landscape**

Approximately 19 percent of the project area is within the Modified Landscape LUD. The goals of this land use designation are to:

- maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs,
- seek to provide a supply of timber from the Tongass National Forest which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this land use designation,
- provide a sustained yield of timber and a mix of resource activities while minimizing the visibility of developments in the foreground distance zone, and
- recognize the scenic values of suitable timber lands viewed from identified popular roads, trails, marine travel routes, recreation sites, bays, and anchorages, and modify timber harvest accordingly.

For Modified Landscape, the desired future condition accepts a somewhat modified landscape, and emphasizes scenic quality in foreground distance zones. Recreation opportunities associated with natural-appearing to modified settings are available. A variety of successional stages provide a range of wildlife habitat conditions. A yield of timber is produced which contributes to Forest-wide sustained yield.

## **Old-growth Reserve**

Less than 1 percent of the project area is designated as Old-growth Reserve. Road construction and timber harvest are generally not allowed within this LUD, and none is proposed under any alternative.

The goals of this designation are to:

- maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources, and
- manage early seral conifer stands to achieve old-growth forest characteristic structure and composition based upon site capability.

For Old-growth Reserve, the desired future condition is that all forested areas attain old-growth forest characteristics and provide a diversity of old-growth habitat types, associated species, and ecological processes.

## **Semi-Remote Recreation**

Less than 1 percent of the project area is designated as Semi-Remote Recreation. No road construction or timber harvest is proposed under any alternative within this LUD.

The goals of this designation are to:

- provide predominantly natural or natural-appearing settings for semi-primitive types of recreation and tourism and for occasional enclaves of concentrated recreation and tourism facilities, and
- provide opportunities for a moderate degree of independence, closeness to nature, and self-reliance in environments requiring challenging motorized or non-motorized forms of transportation.

The desired future condition in the Semi-Remote Recreation LUD is to maintain a generally unmodified natural environment, with minimal human uses and activities.

Table 1-1 shows the acreages and percentages within the project area of each land use designation and of lands in other ownership. The Land Use Designation map for Alternative 1, at the end of Chapter 2, displays the location of these land allocations within the project area.

**Table 1-1**  
**Project Area Current Land Use Designations and non-National Forest Acreages**

Land Use Designation	Acre	Percent of Project Area
Timber Production	11,389	79%
Modified Landscape	2,779	19%
Old-growth Reserve	112	< 1%
Semi-Remote Recreation	41	< 1%
Other Ownership	103	< 1%
<b>Total Land Area Acres</b>	<b>14,424</b>	<b>100%</b>

Source: James Llanos, GIS, 2001

## Key Forest-wide Standards and Guidelines in Project Area

The following standards and guidelines delineate areas not available for programmed timber harvest within the Timber Production LUD. Each applies to a specific habitat or ecological component. More detailed information about these and other standards and guidelines can be found in the Forest Plan, Chapter 4.

### Beach and Estuary Fringe

The beach and estuary fringe is an area of approximately 1,000 feet inland from mean high tide along all marine coastlines. Programmed timber harvest is not allowed and roads are located outside of the fringe when possible.

### Karst and Caves

Surveys were conducted to search for karst and caves. Important karst and cave resources were found within the project area, and mitigation measures were included in all alternatives. All proposed harvest units and access road segments were modified to exclude high-vulnerability karst. Potential effects and mitigations for karst are discussed in the Geology resource section in Chapter 3 and in the Unit and Road Cards, Appendix B.

### Riparian

Riparian Management Areas are areas of special concern regarding fish, other aquatic resources, and wildlife. These areas are delineated according to the process-group direction in the Riparian Forest-wide Standards and Guidelines. All riparian area boundaries follow the Forest-wide Standards and Guidelines, and no timber harvest is proposed within Riparian Management Areas.



## Public Involvement

### Scoping

The Council on Environmental Quality (CEQ) defines scoping as "...an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action" (40 CFR 1501.7). The scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the EIS process. Although scoping is to begin early, it is really a process that continues until a decision is made. In addition to the following specific activities, the Licking Creek Timber Sale has been listed on the Tongass National Forest Schedule of Proposed Actions and included in the Tongass National Forest 10-Year Timber Sale Action Plan since 2000.

#### Notice of Intent (NOI)

A Notice of Intent was published in the Federal Register on July 6, 2001, when it was decided that an EIS was to be undertaken for the project.

#### Public Mailings

On November 16, 2000, a scoping letter was mailed to 385 individuals and groups that had previously shown interest in Forest Service projects in Southeast Alaska. This included Federal and State agencies, Alaska Native groups, municipal offices, businesses, interest groups, and individuals. We received 11 responses to this initial mailing. On June 4, 2001, a second letter that displayed the significant issues and alternatives was mailed to 360 individuals and groups. We received 11 additional responses to this mailing. The project was also briefly mentioned in general newspaper articles concerning the Ketchikan-Misty Fiord Ranger District's activities.

#### Consultations with Tribal Governments

Government-to-government consultations with federally recognized tribal governments and meetings with traditional tribal governments have taken place as follows:

- Ketchikan Indian Corporation (KIC) – July 20, 2001
- Saxman Tribal Council – August 9, 2001
- Metlakatla Indian Community (MIC) – November 6, 2001
- Traditional tribal representatives for Tongass Tribe and Saxman

Tribal concerns were considered in the environmental analysis of effects of the alternatives. However, consultation with tribal governments does not imply that they endorsed the proposed action or any of the alternatives.

#### Consultations with Agencies, Communities and Other Groups

Letters were received from the Alaska Dept. of Fish and Game (September 25, 2001) and U.S. Fish and Wildlife Service (September 17, 2001) that concurred with the existing location of the small Old-growth Reserves in VCU 7460, as they were designated for the Sea Level Timber Sale. The Sea Level project area encompassed the Licking Creek Timber Sale project area.

## Issues

### Key Issues

Issues for the Licking Creek Timber Sale were identified through public and internal scoping. The project Interdisciplinary Team analyzed all comments submitted, and considered the human dimension as well as the biological and physical environment. Similar concerns were combined into one issue statement where appropriate. The following four issues were determined to be key and within the scope of the project decision. We developed alternatives to the proposed action to respond to these issues.

#### Issue 1: Timber Economics

There is a concern about the economic viability of timber sales, and how the timber industry contributes to the overall economic health of the Ketchikan area and Southeast Alaska. This issue includes several comments, such as:

- Timber volume: Maximize volume; meet the Allowable Sale Quantity; show a good profit; limit use of helicopter harvest; maximize clearcuts to maximize profits.
- Community economic health: Ketchikan's economy needs more timber sales; keep a timber sale program going; keep timber available; offer both small and medium sales from the project area.

#### Issue 2: Wildlife Habitat

The cumulative effects of past, present and proposed timber harvest may reduce habitat for deer and other wildlife. This may lead to reductions in deer and wolf populations, and may affect opportunities to hunt deer in the project area. Public comments included:

- Vary silvicultural prescriptions to enhance deer habitat.
- Display effects of roads on wildlife habitat and management indicator species.

#### Issue 3: Watersheds and Fish Habitat

The cumulative effects of past, present and proposed timber harvest may impact downstream water quality and fish habitat in the project area. This issue includes several comments, such as:

- Design roads to minimize runoff.
- Display effects of roads on Class I (anadromous) fish habitat.
- Analyze sediment for fish habitat.
- Study stream temperature.
- Consider cumulative effects.
- Discuss and display high hazard soils and steep slopes.
- Restore fish passage at stream crossings.
- Include mitigation to reduce windthrow in riparian buffers.
- Standards and Guidelines are adequate to protect from road erosion.

#### Issue 4: Transportation

An open road system should be managed to meet our current and future capability for road maintenance. In order to obtain an affordable road system with all roads properly maintained, the majority of roads (and all new roads) would be closed after completion of timber harvest and silvicultural activities. Several concerns were expressed about road management:

- Build roads and keep open to facilitate future harvest opportunities.
- Maximize roads to facilitate conventional yarding and reduce logging costs.
- Close roads after harvest.

# 1 Purpose and Need

## Other Concerns

- Remove roads, rather than blocking to close them, after harvest.
- Road building and maintenance is costly - do not build any new roads.

Other comments received during public scoping, and concerns raised internally, were also considered but not identified as key issues for this project. These concerns were either addressed through mitigation, would not be affected by any of the action alternatives, or were already regulated by Forest Plan Standards and Guidelines. Many of these are discussed in Chapter 2 under "Items Common to All Action Alternatives." The following concerns were considered in development of the action alternatives.

### Karst

A band of karst, with sensitive features such as caves and sinkholes, runs across the project area. Timber harvest and road building could impact these resources. Mitigation measures were included in all alternatives, and all proposed harvest units and access road segments were modified to exclude high-vulnerability karst.

### Scenery

The possibility of cumulative effects of past timber harvest and additional harvest not meeting Forest Plan Standards and Guidelines for Scenery was raised as an internal concern. Public comments included:

- The project area can be logged, it is not visible from Ketchikan and very few people will see this area.
- No need to exceed (improve upon) the Forest Plan Standards and Guidelines for Scenery; this is not a high tourist area.

Timber harvest units were modified during planning and alternative development to minimize impacts on scenery.

### Subsistence

The possibility of reductions in wildlife habitat, which may result in a significant possibility of a significant restriction on subsistence use, was raised internally as a concern. However, the project area is not within a high-use subsistence area, and no significant concerns about subsistence resources and use were identified during public scoping or consultation with tribal governments. For all subsistence resources, including deer, it is not expected that project-related or reasonably foreseeable future activities would cause a significant possibility of a significant restriction on subsistence use in the project area.

### Other Comments

- Band-tailed pigeons were observed in the project area during field surveys in 2001. During consultation with Alaska Dept. of Fish and Game, this species was identified as a species of special interest because Southeast Alaska is the northern periphery of its range.
- Comments expressed concern about timber harvest on steep slopes (greater than 72 percent), and suggested that this harvest be limited to small areas.

## Federal and State Permits, Licenses, and Certifications

To proceed with timber harvest as addressed in this Draft EIS, various permits must be obtained from Federal and State agencies. The following permits have been obtained for the existing log transfer facility (LTF) at Shoal Cove. No other permitting requirements have been identified for the proposed project.

### **State of Alaska, Department of Natural Resources**

Use of the existing Shoal Cove log transfer facility (LTF) requires authorization for occupancy and use of tidelands and submerged lands from the Alaska Department of Natural Resources. These authorizations have been obtained.

### **State of Alaska, Department of Environmental Conservation**

DEC participates in cooperative water quality management through Section 319 of the Clean Water Act and a Memorandum of Agreement with the Forest Service. They also issue a certification of compliance with Alaska Water Quality Standards under Section 401 of the Clean Water Act. A certification of compliance has been obtained for the Shoal Cove LTF.

### **U.S. Army Corps of Engineers**

Section 404 of the Clean Water Act (1977, as amended) requires a permit from the Corps of Engineers before filling or dredging in wetlands and tidelands. A permit has been obtained for the Shoal Cove LTF.

Road construction would be done in accordance with Best Management Practices listed in 33 CFR 323.4 (a) (6). Under an exemption, no 404 permits are needed for road construction and timber harvest that are conducted for silvicultural purposes. The Shoal Cove road system is not connected to any community, and all new roads will be closed after timber harvest.

### **U.S. Environmental Protection Agency**

A Storm Water Discharge Permit and a National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act) have been obtained for the Shoal Cove LTF.

## Applicable Laws and Executive Orders

Shown below is a partial list of Federal laws and Executive Orders pertaining to project-specific planning and environmental analysis on Federal lands. While most pertain to all Federal lands, some of the laws are specific to Alaska. Disclosures and findings required by these laws and orders are contained in Chapter 2 of this EIS.

- Alaska Native Claims Settlement Act (ANCSA) of 1971
- Alaska National Interest Lands Conservation Act (ANILCA) of 1980
- American Indian Religious Freedom Act of 1978
- Archeological Resource Protection Act of 1980
- Cave Resource Protection Act of 1988
- Clean Air Act of 1970 (as amended)
- Clean Water Act of 1977 (as amended)
- Coastal Zone Management Act (CZMA) of 1972 (as amended)
- Coastal Zone Management Act MOU of 1999
- Endangered Species Act (ESA) of 1973 (as amended)
- Executive Order 11593 (cultural resources)
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13007 (Indian sacred sites)
- Executive Order 13175 (government-to-government consultation)
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
- Magnuson-Stevens Fishery Conservation and Management Act of 1996
- Marine Mammal Protection Act of 1972
- Multiple-Use Sustained-Yield Act of 1960
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- National Historic Preservation Act of 1966 (as amended)
- Tongass Timber Reform Act (TTRA) of 1990
- Wild and Scenic Rivers Act of 1968, amended 1986



## State of Alaska

The Coastal Zone Management Act (CZMA) of 1972, as amended, pertains to the preparation of an EIS. Federal lands are not included in the definition of the coastal zone as prescribed in the CZMA. However, the Act requires that when Federal agencies conduct activities or developments that affect the coastal zone, the activities be consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Management Program (ACMP). Such “consistency determinations” are made by the Forest Service, and are reviewed by the State of Alaska as required by the CZMA.

The Alaska Coastal Management Program incorporated the Standards and Guidelines of the Alaska Forest Resources and Practices Act (AFRPA) of 1979 for timber harvesting and processing. The Forest Plan Standards and Guidelines and mitigation measures described in Chapters 2 and 3 of this document meet or exceed the State standards. The AFRPA Findings regarding consistency are included in Chapter 2.

## Availability of Planning Record

Additional documentation may be found in the Licking Creek Timber Sale project planning record. The planning record includes all project information, including detailed resource reports and the results of public involvement efforts. The planning record is located at the Ketchikan-Misty Fiords Ranger District Office in Ketchikan, Alaska, and is available for review during regular business hours. Information from the record is available upon request.

Other reference documents, such as the Tongass Land and Resource Management Plan and the Tongass Timber Reform Act, are available at public libraries throughout Southeast Alaska and at the Forest Supervisor's office in Ketchikan. The Tongass Land and Resource Management Plan is also available on the Internet and CD-ROM.

## Draft EIS

### Availability of Draft EIS for Public Comment

Availability of this Draft EIS was announced in the Federal Register and through notices in local papers. These notices started a 45-day comment period. Draft EIS documents were also mailed to Federal and State agencies, Alaska Native and municipal offices, and other interested parties who had requested copies.

# 1 Purpose and Need



Licking Creek anadromous fish barrier; photo by Ricardo Sainz



# **Chapter 2**

## **Alternatives**



# Chapter 2

## Alternatives

### Introduction

This chapter describes and compares the alternatives for the Licking Creek Timber Sale project. It includes a discussion of how alternatives were developed, an overview of mitigation measures, monitoring and other features common to all alternatives, a description and map of each alternative considered in detail, and a comparison of these alternatives focusing on the significant issues. Alternative 4 is the Preferred Alternative. Chapter 2 is intended to present the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14).

The information used to compare alternatives at the end of this chapter is summarized from Chapter 3, "Affected Environment and Environmental Consequences." Chapter 3 contains the detailed scientific basis for establishing baselines and measuring the potential environmental consequences of each of the alternatives.

### Development of Alternatives

This chapter describes the Proposed Action, three other action alternatives and a No-action Alternative. These alternatives were developed to address the Purpose and Need for the project, to meet Forest Plan Standards and Guidelines and applicable laws, and to respond to the significant issues that were identified during our public involvement process.

During the early planning phase of this project, a logging system and transportation analysis was completed for the project area. Based on this analysis, the suitable timber in the project area was divided into potential harvest areas, or units. This group of units is called the unit pool and is described in the Silviculture and Timber Resources section in Chapter 3. We made use of topographic maps and aerial photos, a large quantity of resource data available in geographic information system (GIS) format, and field verification to identify and design the units.

Potential harvest units were validated, modified, dropped and/or deferred based on findings of the interdisciplinary team (IDT). Modifications were made as needed to meet Forest Plan Standards and Guidelines. For instance, if a previously unknown stream was discovered, the Riparian Standards and Guidelines were applied. Some units were adjusted to have more logical boundaries or to facilitate logging systems. This effort led to the current unit pool, from which the action alternatives were developed. Site-specific descriptions and resource considerations for each potential harvest unit (called "unit cards") are included in Appendix B of this Draft EIS. Proposed access methods are also described in Appendix B ("road cards").

Each alternative provides a different response to the significant issues for the Licking Creek project, and was developed through an intensive IDT evaluation. The IDT used information from the analysis of scoping comments, in conjunction with the field-verified pool of units for

the project area, to formulate different alternative approaches. Preliminary analysis and management direction were used to further refine the alternatives.

The action alternatives presented in this document provide a range of options to achieve the purpose of the project. Within this range, various combinations of alternatives can be considered in determining the selected alternative.

### Items Common to All Alternatives

All alternatives including the Proposed Action are consistent with the Forest Plan. All applicable Forest-wide and Land Use Designation Standards and Guidelines have been incorporated. The Forest Service uses many mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. Additional direction comes from applicable Forest Service manuals and handbooks.

The following items are listed to highlight some of the key direction from the Forest Plan (primarily from Chapter 4, "Forest-wide Standards and Guidelines"). See also the next section, Project-specific Mitigation, and the unit cards and road cards in Appendix B.

#### Standards and Guidelines

##### Biodiversity and Old Growth

Each alternative complies with the Forest Plan conservation biology strategy designed to ensure well-distributed viable populations of wildlife.

One medium and one small Old-growth Habitat Reserve (OGR) occur within VCU 7460. The medium OGR is outside of the project area, and is located on the west side of Carroll Inlet.

The small Old-growth Habitat Reserves (Old-growth Reserve land use designation) mapped in the Forest Plan Final EIS have been evaluated through an interagency process for size, spacing, and habitat composition. The small Old-growth Habitat Reserves, as designated in the Sea Level EIS, were approved by an interagency team of biologists for the Licking Creek project area. A portion of one small OGR occurs at the upper edge of the project area.

##### Fish and Marine Habitats

Forest Plan Standards and Guidelines for riparian areas would be applied to all fish streams within the project area, and to non-fish-bearing Class III streams.

The watershed resource report for the project included watershed and site-level considerations. No adjustments to Riparian Management Area (RMA) boundaries were identified, and all proposed RMAs follow the Forest Plan Standards and Guidelines. Unit cards and road cards (Appendix B) show which streams are likely to need special attention during implementation, such as applying timing restrictions for in-stream activities, or using larger-than-normal culverts or bridges.

No new log transfer facilities (LTFs) are proposed. Monitoring surveys, as required by State of Alaska permits, have been conducted and effects on marine resources were within permitted levels.

##### Karst Resources

All activities have been designed to avoid high-vulnerability karst, and to meet Forest Plan Standards and Guidelines for low- and moderate-vulnerability karst areas.

##### Heritage Resources

Areas considered as having a high probability of containing heritage resources (cultural sites) have been surveyed by heritage resource specialists. All identified cultural sites were avoided in the project design for all alternatives. We obtained concurrence from the Alaska State

Historic Preservation Officer and other interested parties that sites eligible for the National Register of Historic Places would not be affected by actions of any of the alternatives.

## **Recreation**

Recreation resources provide opportunities on National Forest System lands in concert with, and supplemental to, those opportunities which are located on other land ownerships and jurisdictions. The following Forest Plan guidance is applicable to recreation areas, sites, and facilities in the Licking Creek project area:

- complement commercial public services (i.e., resorts, marinas, stores, service stations) within communities or on private or other public land,
- support a system of anchorages suitable for recreation boats along small boat waterways, which connect communities or provide access to popular recreation attractions, and
- provide other appropriate facilities to meet specific identified recreation needs on a case-by-case basis.

## **Scenery**

No lands within the project area are within the Scenic Viewshed LUD. Proposed timber harvest units have been designed to meet the visual quality objectives of the Timber Production and Modified Landscape LUDs.

## **Soils, Water Quality and Wetlands**

Potential harvest units with slopes greater than 72 percent have received an on-site analysis of slope, and an assessment of potential downstream effects. Only areas with relatively low levels of risk are included in the unit pool.

Road locations avoid slopes greater than 67 percent, unstable areas, and slide-prone areas where it is feasible to do so. All roads will be located and designed to avoid or minimize effects on wetlands.

## **Subsistence**

All alternatives have been evaluated for compliance with ANILCA, Title VIII, Section 810. None of the alternatives would result in a significant possibility of a significant restriction on subsistence resources or uses in WAA 406 or the Licking Creek project area. However, because the Forest Plan analysis showed that deer was the resource that might be significantly affected by implementation of the timber sale program across the entire Tongass National Forest, subsistence hearings will be held during the public comment period for this Draft EIS.

## **Threatened, Endangered and Sensitive Species**

Biological assessments have been completed, and concurrence is being sought from the responsible Federal agencies, for threatened or endangered species potentially inhabiting the project area. Standards and guidelines have been applied as needed to ensure that any listed species or its associated habitat would not be adversely affected. Adverse effects to listed species are not expected from implementation of any of the action alternatives.

Biological evaluations for all sensitive species potentially inhabiting the project area have been completed. The Forest Plan contains standards and guidelines for each designated sensitive species, and these are incorporated into the project as applicable. Forest Plan Standards and Guidelines would be applied to minimize any potential adverse effects on sensitive species.

## **Wildlife Habitats**

The Forest Plan conservation biology strategy, including all species-specific standards and guidelines, is considered sufficient to maintain habitat for viable populations of all species potentially within the Tongass National Forest, including small endemic terrestrial mammals.

The Licking Creek Timber Sale is part of the Revillagigedo Island/Cleveland Peninsula biogeographic province, which is considered a high-risk province for American marten habitat.



In such areas, timber harvest units that contain high-value marten habitat must meet specific Forest Plan Standards and Guidelines. Because less than 33 percent of the original productive old-growth (POG) forest has been harvested in VCU 7460, standards and guidelines include retaining: 1) 10-20 percent of the original stand structure, 2) an average of at least four large trees (20-30 inch DBH or greater) per acre for future snag recruitment, 3) an average of at least three large decadent trees per acre, and 4) an average of at least three pieces per acre of down material (logs 20-30 inches or greater in diameter and 10 feet long), generally distributed throughout the harvest unit. Retained trees should have a reasonable assurance of windfirmness and should be uniformly distributed throughout the stand, but they may be clumped for operational concerns or ecological opportunities.

### Roadless Area

The Licking Creek project area boundary encompasses a portion of the North Revilla Roadless Area 526. In the 1997 Roadless Inventory, Roadless Area 526 is 217,818 acres in size, of which 3,157 acres are within the project area (Figure 3-11). In the draft 2002 Roadless Inventory, Roadless Area 526 is 232,038 acres in size, of which 6,538 acres are within the project area (Figure 3-12). No harvest units or road building are proposed under any of the alternatives within Roadless Area 526, as defined by either the 1997 or draft 2002 inventories. The proposed timber sale project would not affect its eligibility for wilderness designation.

## Project-specific Mitigation

The analysis documented in this Draft EIS discloses the possible adverse impacts that may occur from implementing the actions proposed under each alternative. Measures have been formulated to mitigate or reduce these impacts. These measures were guided by the direction from the Forest Plan previously described in this chapter and in Chapter 1.

IDT specialists use on-the-ground inventories, computer (GIS) data, and aerial photographs to prepare the documents called unit cards for each harvest unit in the unit pool for the project. Similar cards are also prepared for each segment of road. Resource specialists include their concerns on the cards and then describe how the concerns are to be mitigated (if not completely avoided) in the design of each unit and road segment. These cards can be found in Appendix B. Resource concerns and mitigation measures will be refined further during final layout, when specialists have another opportunity to revise their unit and road card recommendations.

Applicable Forest Plan Standards and Guidelines, the "Best Management Practices" (BMPs) used to meet the requirements of the Clean Water Act, and project-specific mitigation measures are identified on the unit and road cards (Appendix B).

## Monitoring

Monitoring activities can be divided into Forest Plan monitoring and project-specific monitoring. The National Forest Management Act requires that National Forests monitor and evaluate their forest plans (36 CFR 219.11). Chapter 6 of the Forest Plan includes the monitoring and evaluation activities to be conducted as part of Forest Plan implementation. There are three categories of Forest Plan monitoring:

- Implementation monitoring: used to determine if the goals, objectives, standards and guidelines, and practices of the Forest Plan are implemented in accordance with the Forest Plan.
- Effectiveness monitoring: used to determine if the Forest Plan Standards and Guidelines and practices, as designed and implemented, are effective in accomplishing the desired result.



- Validation monitoring: used to determine whether the data, assumptions, and estimated effects used in developing the Forest Plan are correct.

Effectiveness and validation monitoring are not typically done as part of project implementation. Implementation monitoring, and any additional project-specific monitoring, is, however, an important aspect of the project.

## **Routine Implementation Monitoring**

Routine implementation monitoring assesses whether the project was implemented as designed and whether or not it complies with the Forest Plan. Planning for routine implementation monitoring began with the preliminary design of harvest units and roads (see previous discussion of mitigation). The unit and road cards (Appendix B), and unit silvicultural prescriptions would be the basis for determining whether recommendations were implemented for various aspects of the Licking Creek Timber Sale project.

Routine implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors ensure that the prescriptions contained on the unit and road cards, and the unit silvicultural prescriptions, are incorporated into contract documents; they then monitor performance relative to contract requirements. Input by resource staff specialists, such as fisheries biologists, soil scientists, hydrologists, and engineers, is regularly requested during this implementation monitoring process. These specialists provide technical advice when questions arise during project implementation.

Tongass National Forest staff annually conduct a review of BMP implementation and effectiveness. The results of this and other monitoring are summarized in a Tongass National Forest Annual Monitoring and Evaluation Report. This report provides information on how well the management direction of the Forest is being carried out, and measures the accomplishment of anticipated outputs, activities and effects.

## Alternatives Considered in Detail

The Proposed Action (Alternative 4) and three other action alternatives are considered in detail. Alternative 1 is the No-action Alternative, under which the project area would have no new timber harvest or road construction at this time. The other action alternatives represent different means of satisfying the Purpose and Need than does the Proposed Action, by responding with different emphases to the significant issues discussed in Chapter 1. Maps of all alternatives considered in detail are provided at the end of this chapter. The map for Alternative 1, the No-action Alternative, represents the current condition of the project area. Larger-scale maps of the alternatives are contained in the project planning record.

Table 2-1  
Harvest Objectives and Practices of the Alternatives

Category	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Silvicultural Systems (acres)</b>					
Even-aged	0	253	551	784	737
Uneven-aged	0	0	22	6	28
<b>Total Acres</b>	<b>0</b>	<b>253</b>	<b>573</b>	<b>790</b>	<b>765</b>
<b>Harvest Systems (CCF)</b>					
Cable	0	5,293	12,537	22,964	8,421
Shovel	0	303	711	4,392	642
Helicopter	0	5,113	10,584	6,200	23,198
<b>Harvest Volume <sup>1/</sup></b>		5.4	11.9	16.8	16.1
<b>[MMBF (CCF)] <sup>2/</sup></b>	0	10,709	23,832	33,556	32,261
<b>Roads (miles)</b>					
New construction--classified	0	0.67	1.06	3.13	0
New construction--temporary	0	0.83	1.11	2.36	0
<b>Total New Road Miles</b>	<b>0</b>	<b>1.50</b>	<b>2.17</b>	<b>5.49</b>	<b>0</b>
Reconstruction	0	4.11	4.11	1.65	4.11

<sup>1/</sup> Excluding right-of-way volume

<sup>2/</sup> MBF = 1000 board feet; CCF = 100 cubic feet

Source: D. Fletcher, 2002

### Alternative 1 - No Action

This alternative proposes no new timber harvest or road construction. It does not preclude timber harvest from other areas, or from Licking Creek at some time in the future. The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14d) requires that a "no action" alternative be analyzed in every EIS. This alternative represents the baseline against which the other alternatives are compared. The map for Alternative 1 shows the current distribution of vegetation.

This alternative would not provide for an economic timber supply as described in the Purpose and Need (Chapter 1). It would have no adverse effects on water quality and fish habitat, old-growth associated wildlife, subsistence, or scenic views.

This alternative would not move the project area towards the desired future condition described in the Forest Plan. The existing condition would continue to be influenced by natural disturbance processes, other timber sales scheduled to occur on National Forest System lands, and activities on other ownerships. The No-action Alternative provides a benchmark that allows the decision makers to compare the magnitude of the environmental effects of the action alternatives with the current condition.

## Alternative 2

This alternative was designed to minimize potential and cumulative effects to watersheds and fish habitat (Issue 3). A low level of timber harvest was dispersed across the watersheds in the project area, and areas of particular concern (e.g. Unit 8 and unnamed watershed 19) were avoided.

The timber volume proposed for harvest in Alternative 2 is 5.4 MMBF (10,709 CCF) on 253 acres of National Forest System lands. The project would provide opportunities for timber harvesting by local operators. It would convert 253 acres of old-growth stands to an even-aged condition. Timber would be removed by helicopter, cable and shovel logging.

Alternative 2 includes 0.67 miles of new (classified) road construction, 0.83 mile of temporary road, and reconstruction of 4.11 miles of existing road on National Forest System land, to move logs to the existing log transfer facility at Shoal Cove. After harvest activities are completed, all new project roads would be closed. Roads would be maintained at Maintenance Level 1 (closure), where custodial maintenance is performed to protect the road investment and reduce impacts to adjacent resources to an acceptable level. Non-motorized travel would not be restricted.

This alternative would harvest the following units: 1, 2, 11, 12, 14, 29, 30, 33, 34, 35, 38, 63, 68, and 70. It would use the following new and existing roads: 8400000, 8400420, 8400445, 8442000, 8444000, 8444200, 8444300, 8446000, and 8446100. (See the Alternative 2 map at the end of this chapter, and the Unit and Road Cards in Appendix B.)

## Alternative 3

This alternative was designed to minimize potential and cumulative effects to critical deer winter range (Issue 2), by shifting timber harvest away from south-facing slopes and lower elevation habitats to other areas.

The timber volume proposed for harvest in Alternative 3 is approximately 11.9 MMBF (23,832 CCF) on 573 acres of National Forest System lands. The project would provide opportunities for timber harvesting by local operators. It would convert 551 acres of old-growth stands to an even-aged condition, and convert 22 acres of old-growth stands to an uneven-aged condition. Timber would be removed by helicopter, cable and shovel logging.

Alternative 3 includes 1.06 miles of new (classified) road construction, 1.11 miles of temporary road, and reconstruction of 4.11 miles of existing road on National Forest System land, to move logs to the existing log transfer facility at Shoal Cove. After harvest activities are completed, all new project roads would be closed. Roads would be maintained at Maintenance Level I (closure), where custodial maintenance is performed to protect the road investment and reduce impacts to adjacent resources to an acceptable level. Non-motorized travel would not be restricted.

This alternative would harvest the following units: 1, 2, 9, 10, 11, 12, 14, 22, 24, 29, 30, 31, 33, 34, 35, 38, 39, 40, 63, 64, 65, 68, and 70. It would use the following new and existing roads: 8400000, 8400420, 8400445, 8400450, 8442000, 8444000, 8444200, 8444300, 8446000, and 8446100. (See the Alternative 2 map at the end of this chapter, and the Unit and Road Cards in Appendix B.)

## Alternative 4 – Proposed Action

Alternative 4 was designed to respond to the issue of timber for the local economy (Issue 1). This alternative was designed to provide an economic timber sale with a moderate level of timber volume, not the maximum volume currently available in the project area, and to balance timber harvest with effects on other resources. The unharvested volume could be available for possible future harvest (such as a small sale contract).

The timber volume proposed for harvest in Alternative 4 is approximately 16.8 MMBF (33,556 CCF) on 790 acres of National Forest System lands. It would convert 784 acres of old-growth stands to an even-aged condition, and convert 6 acres to an uneven-aged condition. Timber would be removed by helicopter, cable and shovel logging.

## 2 Alternatives

Alternative 4 includes 3.13 miles of new (classified) road construction, 2.36 miles of temporary road, and reconstruction of 1.65 miles of existing road on National Forest System land, to move logs to the existing log transfer facility at Shoal Cove. After harvest activities are completed, all new project roads would be closed. Roads would be maintained at Maintenance Level I (closure), where custodial maintenance is performed to protect the road investment and reduce impacts to adjacent resources to an acceptable level. Non-motorized travel would not be restricted.

This alternative would harvest the following units: 8, 9, 10, 11, 19, 24, 29, 31, 34, 35, 40, 43, 44, 50, 51, 63, 65, 67, 68, 70, and 71. It would use the following new and existing roads: 8400000, 8400420, 8400445, 8400450, 8400451, 8400470, 8442000, 8444000, 8444050, 8444051, 8444060, 8444200, 8446000, and 8446150. (See the Alternative 2 map at the end of this chapter, and the Unit and Road Cards in Appendix B.)

### Alternative 5

Alternative 5 was designed to respond to the issue of new road construction (Issue 4), by conducting all timber harvest from existing roads in the project area and not constructing any new roads.

The timber volume proposed for harvest in Alternative 5 is approximately 16.1 MMBF (32,261 CCF) on 765 acres of National Forest System lands. The project would provide opportunities for timber harvesting by local operators. It would convert 737 acres of old-growth stands to an even-aged condition, and convert 28 acres of old-growth stands to an uneven-aged condition. Timber would be removed primarily by helicopter (72 percent of the volume), but also by cable and shovel logging.

No new road construction is proposed under Alternative 5. It would require reconstruction of 4.11 miles of existing road on National Forest System lands, to move logs to the existing log transfer facility at Shoal Cove.

This alternative would harvest the following units: 1, 2, 8, 9, 10, 12, 19, 22, 24, 29, 31, 33, 34, 38, 39, 40, 50, 63, 64, 67, 68, 70, and 71. It would use the following existing roads: 8400000, 8400420, 8400450, 8442000, 8444000, 8446000, and 8446100. (See the Alternative 2 map at the end of this chapter, and the Unit and Road Cards in Appendix B.)

## Alternatives Considered but Eliminated from Detailed Study

One alternative was suggested during public scoping and was considered early in the planning process, but was not included in the Draft EIS for detailed study.

**Maximize Timber Harvest:** This option was to maximize timber harvest volume from a broad area surrounding the proposed sale area, including portions of the North Revilla Roadless Area 526. Inclusion of additional units and roads was considered but eliminated from detailed study as beyond the scope of the analysis for this project.

Harvest of additional units and construction of additional roads not considered in the proposed action (and not connected to the proposed action) is beyond the scope of this analysis. This project-level environmental analysis evaluates the impacts of a specific proposal in a specific place and time. It does not attempt to set management direction for an area of land (which was done in the Forest Plan). It also does not preclude future proposals for additional timber harvest from the surrounding area, which would be considered on their own merits at that time.



## Comparison of Alternatives

This section compares outputs, objectives and effects of the alternatives in terms of the significant issues for the Licking Creek Timber Sale project. The discussions of effects are summarized from Chapter 3, which should be consulted for a full understanding of these and other environmental consequences. The table below provides an overview comparison of information from the alternative descriptions and Chapter 3 relevant to the issues. This information will be used in the discussions that follow.

Table 2-2  
Comparison of Alternatives by Issue

Issues	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Issue 1: Timber Economics</b>					
Average harvest cost <sup>1/</sup> (\$/CCF)	0	171.47	155.08	130.64	162.78
Direct income generated (millions \$)	0	1.26	2.80	3.95	3.80
Direct job years created <sup>2/</sup>	0	28	63	89	85
<b>Issue 2: Wildlife Habitats <sup>3/</sup></b>					
Reduction in potential deer habitat from existing conditions <sup>3/</sup>	0	2%	4%	8%	5%
Cumulative reduction in potential deer habitat since 1954 <sup>3/</sup>	33%	34%	36%	39%	36%
Reduction in marten high-value habitat capability <sup>3/</sup> (from existing)	0	4%	11%	14%	15%
Post-harvest open road density (marten habitat recommended level: 0.2 mi./ sq.mi.)--VCU 7460	0.8	0.8	0.8	0.8	0.8
Post-harvest open road density (wolf habitat recommended level: 0.7 mi./ sq.mi.)—WAA 406	0.3	0.3	0.3	0.3	0.3
<b>Issue 3: Watersheds &amp; Fish Habitat</b>					
Class II stream crossings (reconstructed) <sup>4/</sup> (2 bridges, 1 culvert)	0	3	3	3	3
Class III stream crossings (new) <sup>4/</sup>	0	0	1	2	0
Class IV stream crossings (new) <sup>4/</sup>	0	0	0	2	0
<b>Issue 4: Transportation</b>					
Estimated cost of road construction and maintenance (\$)	0	553,100	660,150	1,078,900	326,000
Possible significant effects from roads on soils and water quality	No	No	No	No	No
<b>Other Concerns</b>					
Possibility of adverse effect on high-vulnerability karst	No	No	No	No	No
Number of proposed harvest units visible from viewpoints	0	2	5	9	9
Significant possibility of significant restriction on subsistence use	No	No	No	No	No

1/ For optional removal of utility logs.

2/ Based on 5.28 direct jobs per MMBF; job year/harvest ratio from Forest Plan

3/ Wildlife effects are reported for the project area, unless otherwise noted.

4/ All new and reconstructed stream crossings would meet standards to provide fish passage.

Source: K. O'Connor, 2002

# 2 Alternatives

## Issues

### Issue 1: Timber Economics

Alternative 1 proposes no timber harvest, and thus offers no opportunity for timber-related employment or personal income. The action alternatives would result in timber-related employment opportunities in proportion to their total harvest volumes. Alternative 4 offers the most timber volume and generates the highest potential number of jobs. It is also the most economically efficient. Alternative 5 offers the second-highest timber volume and generates the second-highest number of jobs, but is economically inefficient due to a high percentage of helicopter harvest. Alternative 3 offers the third-highest timber volume and generates the third-highest number of jobs. Alternative 2 offers the least timber volume and generates the fewest jobs. These last two alternatives are intermediate in economic efficiency.

### Issue 2: Wildlife Habitat

Deer habitat capability is currently above the minimum recommended density to maintain wolf populations in the project area, and this condition would continue under all action alternatives. The numbers of deer would remain adequate to sustain expected hunting levels and subsistence use. The action alternatives would reduce the deer habitat capability, with the effect proportional to the proposed harvest. Alternative 4 would have the greatest effect, followed in decreasing order by Alternative 5, Alternative 3, and Alternative 2. For all action alternatives, post-harvest open road densities would be within the recommended levels for wolves, but above the recommended maximum densities for marten. However, these open roads are not connected to any communities and motor vehicle traffic is light, and the road densities should not adversely affect marten. After harvest activities are completed, all new project roads would be closed.

### Issue 3: Watersheds and Fish Habitat

Anadromous fish (salmon) habitat within the Licking Creek project area is minimal, and the project area watersheds are, generally, unproductive for these species. With the application of Forest Plan Standards and Guidelines, including those for riparian areas, risks to freshwater and marine resources and Essential Fish Habitat would be minimized. Recreational fishing access would be unaffected, as all new roads would be closed after timber harvest and associated silvicultural activities. Of the action alternatives, Alternative 4 would have the greatest potential effect on fish and water resources, followed by Alternative 5, Alternative 3, and Alternative 2. No new stream crossings are proposed on Class I or II streams under any of the action alternatives. Three existing Class II crossings would be reconstructed (two bridges and one culvert) under all action alternatives.

### Issue 4: Transportation

Forest Plan Standards and Guidelines and Best Management Practices (BMPs) would be applied to all road construction activities for all alternatives. New roads planned for Alternatives 2, 3, and 4 would be located to minimize crossing of karst features, wetlands, and slopes and soils at high risk for mass movement. Application of mitigation and BMP measures would minimize erosion of road surfaces, and new stream crossings would be designed to minimize sediment delivery to streams. In order to obtain an affordable road system with all roads properly maintained, the majority of roads (and all new roads) would be closed after completion of timber harvest and silvicultural activities. No new roads are planned for Alternative 5. No new roads or other activities are proposed within any inventoried roadless areas.

## Other Concerns

### Karst

Substantial karst mineral deposits were found in the project area during field reconnaissance, including some highly vulnerable features such as caves and sinkholes. All timber harvest and road construction proposed for the action alternatives would meet Forest Plan Standards and Guidelines for management of karst resources, and avoid high-vulnerability karst and cave features.



## Scenery

Timber harvest units were designed during planning and alternative development to minimize impacts on scenery. Under Alternative 2, only two harvest units would be visible from viewpoints along Carroll Inlet. Portions of five harvest units would be visible under Alternative 3, and nine harvest units under Alternatives 4 and 5. With one exception (discussed below), all timber harvest proposed for the action alternatives would meet the Visual Quality Objectives for the project area.

Conditions between Calamity Creek and Marble Creek currently meet the visual quality objectives for this viewshed. However, the harvest of one unit currently under contract will not meet the visual quality objectives in this area. No timber harvest in this viewshed is proposed under Alternative 2. Timber harvest proposed in Alternatives 3 and 4 would increase the total harvest in this viewshed, but would not substantially add to the impacts created by the existing harvest and the planned harvest unit.

## Subsistence

The project area is not within a high-use subsistence area, and no significant concerns about subsistence resources and uses were identified during public scoping or consultation with tribal governments. Most deer hunting in the project area is by Ketchikan (non-rural) residents, and subsistence use is very light. The proposed timber harvest, for all alternatives, would reduce current deer habitat capability within WAA 406 by only 1 percent. Deer hunting demand, for both subsistence use and non-subsistence hunting, is expected to remain below 10 percent of the habitat capability, which is sustainable. For all subsistence resources, it is not expected that project-related or reasonably foreseeable future activities would cause a significant possibility of a significant restriction in subsistence resources or uses in the project area.

## Specifically Required Disclosures

Several of the laws and executive orders listed in Chapter 1 require project-specific findings or other disclosures. They apply to all alternatives considered in detail in this Draft EIS.

### **National Forest Management Act**

All project alternatives fully comply with the Forest Plan and FSM 2410 R10 Supp. 2400-2002-1 (5/7/2002). This project incorporates all applicable Forest Plan Standards and Guidelines and management area prescriptions as they apply to the project area, and complies with Forest Plan goals and objectives. All required interagency review and coordination will be accomplished; new or revised measures resulting from this review will be incorporated in the Final EIS.

The Forest Plan complies with all resource integration and management requirements of 36 CFR 219 (219.14 through 219.27). Application of Forest Plan direction for the Licking Creek Timber Sale project ensures compliance at the project level. Specific NFMA findings pertaining to silvicultural systems are included in Chapter 3 and the project planning record.

### **Endangered Species Act**

A combined Biological Assessment (BA) and Biological Evaluation (BE) was prepared for the Licking Creek Timber Sale, as required by Section 7 of the Endangered Species Act (ESA), as amended, and the USDA Forest Service Threatened, Endangered and Sensitive Plant and Animal Species Policy (FSM 2670). A BA describes the occurrence of, and potential project effects on, species that are federally listed or proposed for threatened or endangered status. A BE includes equivalent information on Forest Service sensitive species; it is not required under the ESA, but is required by the Forest Service for all internal programs and activities (FSM 2672.4). The complete BA/BE is in the planning record.

None of the alternatives is anticipated to have a direct, indirect, or cumulative effect on any threatened or endangered species in or outside the project area. Consultations with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service are being conducted, and the results will be included in the Final EIS.

### **Tongass Timber Reform Act**

Application of Forest Plan Riparian Standards and Guidelines ensures that no commercial timber harvest will occur within 100 feet of any Class I stream or any Class II stream flowing directly into a Class I stream.

### **National Historic Preservation Act**

Cultural resource surveys of varying intensities have been conducted, following inventory protocols approved by the Alaska State Historic Preservation Officer. Native communities have been contacted and public comment encouraged. The consultation and concurrence process with the State Historic Preservation Officer has been completed. No effects on known significant cultural resources are anticipated. Forest Service timber sale contracts contain enforceable measures for protecting any undiscovered heritage resource that might be encountered during sale operations. See discussion under Heritage Resources in Chapter 3.

### **Federal Cave Resource Protection Act**

During surveys in the Licking Creek project area, we found potentially significant karst and cave resources. These resources are being further explored. Forest Plan Standards and Guidelines for Karst and Caves are being applied, and are discussed under Geology, Minerals and Karst in Chapter 3 and in the unit and road cards in Appendix B.

### **Alaska National Interest Lands Conservation Act (ANILCA)**

A subsistence evaluation was conducted for the action alternatives considered in detail for the Licking Creek Draft EIS, in accordance with ANILCA Section 810. No significant

possibilities of significant restrictions on the abundance and distribution of, access to, or competition for any subsistence resources in the project area are anticipated from implementation of any of the action alternatives. Further, none of the action alternatives impact deer habitat capability to the point that significant restrictions on subsistence use of deer would be anticipated. See discussion under Subsistence in Chapter 3.

## **Clean Water Act**

Section 404 (f)(1)(A) and (E) of the Federal Clean Water Act exempts silvicultural, timber harvesting, and related road construction activities from permit requirements for the discharge of dredge and fill materials into wetlands. See Executive Order 11990 (Wetlands), described in this section. Existing roads in the Licking Creek project area are on an isolated road system not connected to any community. New roads would be maintained at Maintenance Level I (closure), where custodial maintenance is performed to protect the road investment and reduce impacts to adjacent resources to an acceptable level.

The design of harvest units and roads is in accordance with Forest Plan Standards and Guidelines, Best Management Practices, and applicable Forest Service manual and handbook direction. The harvest unit and road cards for the Licking Creek Timber Sale project (Appendix B) include specific requirements prescribed to prevent or reduce non-point sediment sources. Monitoring and evaluation of the implementation and effectiveness of Forest Plan Standards and Guidelines and Best Management Practices would occur. Project activities are expected to meet all applicable State of Alaska water quality standards.

State regulations provide for variances from anti-degradation requirements and water quality criteria. Logging and road-building operators are responsible for compliance, including obtaining variances required by the State. The Forest Service monitors compliance. Timber harvest activities are expected to qualify for any variances in accordance with the Alaska State Code, 18 AAC 70.015.

All roads, landings and rock pits would be designed and constructed in accordance with the applicable Best Management Practices listed at 33 CFR 323.4(a). No permits under Section 404 of the Clean Water Act would be required for any alternative.

## **Clean Air Act**

Emissions anticipated from the implementation of any project alternative would be of short duration and are not expected to exceed State of Alaska ambient air quality standards (18 AAC 50).

## **Coastal Zone Management Act (CZMA)**

The Forest Service has determined those Forest Plan Standards and Guidelines and mitigation measures applicable to the Licking Creek Timber Sale project meet or exceed the requirements of the State of Alaska Coastal Zone Management Plan. Therefore, the project is consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Zone Management Program. Copies of this determination and supporting information are being provided to the State of Alaska, Division of Governmental Coordination, for review as required by the CZMA.

## **Essential Fish Habitat**

The Magnuson-Stevens Fishery Conservation and Management Act requires a finding on the effects of the project on Essential Fish Habitat. We have determined that this project may affect Essential Fish Habitat, but this risk is minimal through the implementation of Standards and Guidelines, and no significant adverse effects are anticipated to occur. (See the discussion in the Watersheds and Fish Habitat section of Chapter 3.) Consultation with National Marine Fisheries Service will continue.

## **Executive Order 11988 (Floodplain Management)**

The numerous streams in the Licking Creek Timber Sale make it essentially impossible to avoid all floodplains during timber harvest and road construction. Forest Plan Standards and

Guidelines for riparian areas exclude most commercial timber harvesting from floodplains. Roads may be constructed in or through floodplains subject to the design requirements of the Best Management Practices. Effects on floodplains from project activities have been avoided or minimized as much as possible. See additional discussion in Chapter 3, Wetlands and Floodplains.

### **Executive Order 11990 (Wetlands)**

Executive Order 11990, as amended (42 U.S.C. 4321 et seq.), requires Federal agencies having statutory authority and leadership over Federal lands to avoid, to the extent possible, the short- and long-term adverse impacts associated with the destruction or modification of wetlands. Where feasible, direct and indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve or enhance the beneficial values of wetlands in carrying out their responsibility to: (1) acquire, manage, and dispose of lands and facilities; (2) provide federally undertaken, financed, or assisted construction and improvements; and (3) conduct Federal activities and programs affecting land use.

Because wetlands are so extensive in the Licking Creek Timber Sale, it is not feasible to avoid all wetland areas. Soil moisture regimes and vegetation on some wetlands may be altered in some harvest units; however, the affected wetlands will meet wetland classification and will still function as wetlands in the ecosystem.

### **Executive Order 12898 (Environmental Justice)**

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal managers to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. This order also directs Federal agencies to collect, maintain and analyze information on the consumption patterns of human populations who primarily rely on fish, vegetation and/or wildlife for subsistence.

The effects of each alternative on subsistence are described in detail in Chapter 3, Subsistence. That discussion concluded that none of the alternatives would be likely to result in a significant possibility of a significant restriction on subsistence resources. The effects of each alternative on timber harvest levels are described in Chapter 3, Issue 1, Timber Economics.

### **Executive Order 12962 (Aquatic Systems and Recreational Fisheries)**

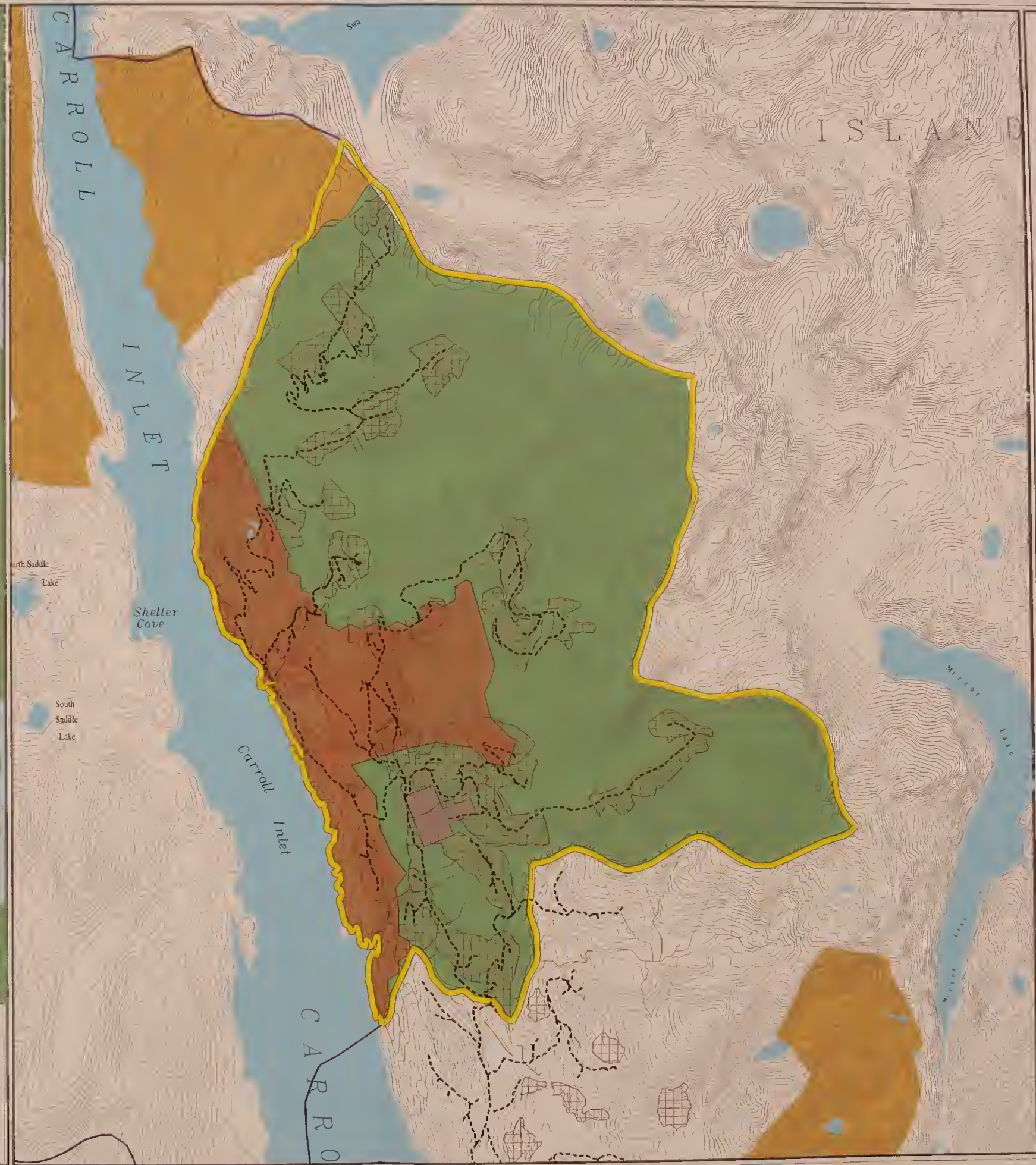
We have determined that this project may affect Essential Fish Habitat, however, with the application of Forest Plan Standards and Guidelines, including those for riparian areas, this risk is minimal, and no significant adverse effects to freshwater or marine resources are anticipated to occur. Recreational fishing access would be unaffected by the proposed road construction, as all new roads would be closed after timber harvest and associated silvicultural activities.





Enlarged Area

Note: Compiled from various digital geographic data. This map may not meet National Map accuracy standards.



### Land Use Designations (Alternative 1) NO ACTION

Land Use Designations (LUD) :

- Timber Production (TM) Maximum Development
- Modified Landscape (ML) Natural Setting and Timber Harvest
- Old Growth Reserves (OGR) Current Location Natural Setting
- Non-NFS Land (NNF)
- Non-Project Area
- Lakes or Saltwater

Previous Activity :

- Previous and Pending Harvest Areas
- Existing or Pending Roads

Other lines:

- AHMU Class I Stream
- AHMU Class II Stream
- AHMU Class III Stream
- AHMU Class IV Stream
- VCU 7460 Boundary
- Project Boundary

Mapscale 1: 63360

Contour Interval - 100 feet

Miles









Note: Compiled from various digital geographic data. This map may not meet National Map accuracy standards.



# Existing Conditions (Alternative 1) NO ACTION

- Land and Forest Conditions :
- Productive Old Growth Forest
  - Non-Productive Old Growth Forest Lands
  - Non-Forested Lands
  - Old Growth Reserves (OGR) Current Location Natural Setting
  - Non-NFS Land (NNF)
  - Non-Project Area
  - Lakes or Saltwater
- Previous Activity :
- Previous and Pending Harvest Areas
  - Existing or Pending Roads
- Other lines:
- AHMU Class I Stream
  - AHMU Class II Stream
  - AHMU Class III Stream
  - AHMU Class IV Stream
  - VCU 7460 Boundary
  - Project Boundary

Mapscale 1: 63360



Contour Interval = 100 feet











Note: Compiled from various digital geographic data. This map may not meet National Map accuracy standards.



# Action Alternative Alternative 2

- Land and Forest Conditions :
- Productive Old Growth Forest
  - Non-Productive Old Growth Forest Lands
  - Non-Forested Lands
  - Old Growth Reserves (OGR) Current Location Natural Setting
  - Non-NFS Land (NNF)
  - Non-Project Area
  - Lakes or Saltwater
  - Alternative Unit

- Previous Activity :
- Previous and Pending Harvest Areas
  - Existing Roads used in this Alternative

- Other lines:
- AHMU Class I Stream
  - AHMU Class II Stream
  - AHMU Class III Stream
  - AHMU Class IV Stream
  - VCU 7460 Boundary
  - Project Boundary
  - Proposed Roads used in this Alternative

Mapscale 1: 63360



Contour Interval = 100 feet











Note: Compiled from various digital geographic data. This map may not meet National Map accuracy standards.



### Action Alternative Alternative 3

**Land and Forest Conditions :**

- Productive Old Growth Forest
- Non-Productive Old Growth Forest Lands
- Non-Forested Lands
- Old Growth Reserves (OGR) Current Location Natural Setting
- Non-NFS Land (NNF)
- Non-Project Area
- Lakes or Saltwater
- Alternative Unit

**Previous Activity :**

- Previous and Pending Harvest Areas
- Existing Roads used in this Alternative

**Other lines:**

- AHMU Class I Stream
- AHMU Class II Stream
- AHMU Class III Stream
- AHMU Class IV Stream
- VCU 7460 Boundary
- Project Boundary
- Proposed Roads used in this Alternative

Mapscale 1: 63360

Contour Interval = 100 feet

Miles









Note: Compiled from various digital geographic data. This map may not meet National Map accuracy standards.



# Action Alternative Alternative 4

- Land and forest Conditions :
- Productive Old Growth Forest
  - Non-Productive Old Growth Forest Lands
  - Non-Forested Lands
  - Old Growth Reserves (OGR) Current Location Natural Setting
  - Non-NFS Land (NNF)
  - Non-Project Area
  - Lakes or Saltwater
  - Alternative Unit
- Previous Activity :
- Previous and Pending Harvest Areas
  - Existing Roads used in this Alternative
- Other lines:
- AHMU Class I Stream
  - AHMU Class II Stream
  - AHMU Class III Stream
  - AHMU Class IV Stream
  - VCU 7460 Boundary
  - Project Boundary
  - Proposed Roads used in this Alternative

Mapscale 1: 63360



Contour Interval - 100 feet











Note: Compiled from various digital geographic data. This map may not meet National Map accuracy standards.



# Action Alternative Alternative 5

- Land and Forest Conditions :
- Productive Old Growth Forest
  - Non-Productive Old Growth Forest Lands
  - Non-Forested Lands
  - Old Growth Reserves (OGR) Current Location Natural Setting
  - Non-NFS Land (NNF)
  - Non-Project Area
  - Lakes or Saltwater
  - Alternative Unit

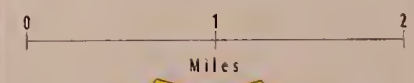
- Previous Activity :
- Previous and Pending Harvest Areas
  - Existing Roads used in this Alternative

- Other lines:
- AHMU Class I Stream
  - AHMU Class II Stream
  - AHMU Class III Stream
  - AHMU Class IV Stream
  - VCU 7460 Boundary
  - Project Boundary
  - Proposed Roads used in this Alternative

Mapscale 1: 63360



Contour Interval = 100 feet







# **Chapter 3**

## **Environment and Effects**



# Chapter 3

## Affected Environment and Environmental Consequences

### Introduction

In this chapter, we describe the environment that would be modified by the Licking Creek project (affected environment), and the potential effects of the alternatives on the environment (environmental consequences). We based the comparison of alternatives presented in Chapter 2 (Table 2-2) on this information. This chapter is divided into two main sections:

**Effects on the Issues**—In this section, we describe the effects of each alternative on the four key issues.

**Other Concerns**—Following the four issues, we summarize the effects on other resources, which are not considered to be key issues for this project but are valuable to discuss.

### Analyzing Effects

Environmental consequences are the effects of implementing an alternative on the physical, biological, social and economic environment. The Council on Environmental Quality (CEQ) regulations, which guide implementation of the National Environmental Policy Act (NEPA), includes several specific categories to use for analysis of environmental consequences. We quantify these effects where possible, and include qualitative discussions. We also describe how potential adverse effects would be reduced or mitigated. (These are described for each specific site in the unit and road cards, Appendix B.)

#### Direct, Indirect and Cumulative Effects

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the cause or action. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. The scope by which effects are measured is not necessarily limited to the project area. The geographical areas within which the effects of activities are analyzed are identified below (under Land Divisions) and within the applicable resource section.

#### Past and Present Actions

Approximately 2,954 acres of timber harvest has occurred in the project area, as follows:

- The first large commercial entries began in 1954. Between 1954 and 1962, 284 acres were harvested from the shoreline, using an A-frame logging method.

# 3 Environment and Effects

- Beginning around 1971, the project area was roaded and conventional cable harvest was initiated.
- About 1,330 acres were harvested from 1972 to 1979. (This includes 103 acres of private land harvested in 1974.)
- From 1980 to 1990, an additional 803 acres were harvested, primarily in the Marble Creek and Twin Lakes Timber Sales.
- From 1991 to 1996, an additional 537 acres were harvested in the Slackline and Swing Timber Sales.

## Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include “reasonably foreseeable future actions” (40 CFR 1508.7). The following timber sales have been sold or are planned near the Licking Creek project area, and are within Wildlife Analysis Area 406.

- Sea Level EIS: The Buckdance and Madder Timber Sales have been sold, and seven Madder units, totaling 249 acres, with approximately 17,000 CCF (8.5 MMBF), are scheduled to be harvested within the Licking Creek project area by 2006.
- Mop Point/91 Knot Timber Sale EA: The decision was signed in 2001. These small sales of approximately 6,000 CCF (3 MMBF) are scheduled to be sold in 2004. One 9-acre unit is within the Licking Creek project area.

## Unavoidable Adverse Effects

Unavoidable adverse environmental effects are those that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of activities. The interdisciplinary procedure used to identify specific harvest units and roads is designed to eliminate or lessen significant adverse consequences. The application of Forest Plan Standards and Guidelines, Best Management Practices, project-specific mitigation measures, and monitoring are all intended to further limit the extent, severity, and duration of potential effects. Regardless of the use of these measures or the alternative selected, some adverse effects will occur.

## Short-Term Use and Long-Term Productivity

Short-term uses, and their effects, are those that occur annually or within the first 10 years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act, and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the resource protection measures described in Chapter 2, in particular those pertaining to the soil and water resources. These are also discussed throughout this chapter, in particular for silviculture and soils.

## Irreversible and Irretrievable Commitments

Irreversible commitments are decisions that affect a resource to the degree that renewal can occur only over a long period of time or at a great expense, or that destroy or remove the resource. For instance, the construction of rock pits for road construction, which removes a resource that cannot be regenerated, is an irreversible commitment. Other examples are mining, destruction of a cultural site, and the extinction of an endangered species.

Irretrievable commitments are opportunities foregone for the period during which the resource use or production cannot be realized. Such decisions are reversible, but the foregone production opportunities are irretrievable. An example is the cutting of trees to create a ski area, as the site would be unavailable for timber production until after the ski area was allowed



to regenerate. Some road building may be considered an irretrievable commitment, depending on the rate at which the road reverted back to natural conditions after closure. These commitments are irretrievable rather than irreversible, because the areas could be harvested in the future if they are returned to the suitable timber base.

## Land Divisions

The land area of the Tongass National Forest has been divided in several ways to describe the different resources and to analyze how they may be affected by Forest Plan and project-level decisions. These divisions vary by resource, since the relationship of each resource to geographic conditions and zones also varies. The allocation of Forest Plan land use designations (discussed in Chapter 1) is one such division. Three other divisions important for the effects analysis - Watersheds, Value Comparison Units (VCUs) and Wildlife Analysis Areas (WAAs) - are briefly described here. The Interdisciplinary Team identifies the boundary of a project area during project planning. A project area may contain several watersheds, VCUs, and WAAs, and/or portions of these land divisions.

### Land Divisions Used to Analyze Environmental Effects for Each Resource

Resource	Analysis Areas
Issue 1: Timber Economics	Project Area
Issue 2: Wildlife	Project Area, VCU 7460, WAA 406
Issue 3: Watersheds & Fish Habitat	Watersheds (within Project Area)
Issue 4: Transportation	Project Area
Biodiversity	Project Area, VCU 7460, WAA 406
Geology, Minerals, and Karst	Project Area
Heritage Resources	Project Area
Log Transfer Facilities	Timber sales using the Shoal Cove road system
Recreation	Project Area
Roadless Area	Project Area, Inventoried Roadless Area #528
Scenery	Project Area
Silviculture & Timber Mgmt	Project Area
Soils	Project Area
Subsistence	Project Area, VCU 7460, WAA 406
Threatened/Endangered Species	Project Area
Wetlands and Floodplains	Project Area

### **Watersheds**

A watershed is an area that contributes water to a drainage or stream and from which all surface water drains to a common point. Watersheds can range from tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Stream Order is a useful classification based on branching of streams. A number from one to six or higher, ranked from headwaters to river terminus, designates the relative position of a stream or stream segment in a drainage basin. First-order streams have no discrete tributaries; the junction of two first-order streams produces a second-order stream; the junction of two second-order streams produces a third-order stream; etc.

Watershed sizes are based on the stream order so that a first-order watershed contains only a first-order stream network. The project area contains nine watersheds: two second-order watersheds, two third-order watersheds, and two fourth-order watersheds. Three of the first-order watersheds are lumped together for analysis purposes; see Figure 3-4.

### **Value Comparison Units (VCUs)**

These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow major watershed divides. The Licking Creek project area lies within VCU 7460, as discussed in Chapter 1. Chapter 1 also includes a map showing the location of this VCU.

# 3 Environment and Effects

## Wildlife Analysis Areas (WAAs)

These are Forest Service land divisions that correspond to the "Minor Harvest Areas" used by the Alaska Department of Fish and Game. There are approximately 190 WAAs that apply to the Tongass National Forest. The Licking Creek project area lies within WAA 406. Information estimated by WAA is used in the wildlife and subsistence analyses.

## Available Information

We store much of the Tongass National Forest resource data in an electronic database formatted for a geographic information system (GIS). The Forest Service uses GIS software to assist in the analysis of this data. GIS data is available in tabular (numerical) format, and as plots displaying data in map format. GIS data is based on our most current information. For this EIS, all of the maps, and most of the numerical analyses, are based on GIS resource data.

Much resource information that was analyzed in other planning documents (such as the Forest Plan Final EIS, other project EISs, and detailed resource reports) was relevant to this project. Where applicable, we have briefly summarized and referenced this information in the resource sections.

Our knowledge about the relationships and conditions of wildlife, fish, forests, jobs and communities is incomplete. The ecology and management of a large forested area are complex and developing sciences. The biology of wildlife species prompts questions about population dynamics and habitat relationships. The interactions of resource supply, communities, and economies are difficult to predict precisely. However, the basic data and central relationships are sufficiently established in the respective sciences for the responsible official to make a reasoned choice between the alternatives, and to adequately assess and disclose the potential adverse environmental consequences.

## Plans of Other Agencies

The CEQ regulations implementing NEPA require a determination of possible conflicts between the Proposed Action and the objectives of Federal, State, and local land use plans, policies, and controls for the area. The major land use regulations of concern are Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), the Coastal Zone Management Act (CZMA), and the State of Alaska's Forest Practices Act. See the "Findings and Disclosures" section of Chapter 2 for discussion of compliance with these laws. State compliance is also discussed at the end of Chapter 1. ANILCA Section 810 requirements pertain to subsistence; these are also discussed in the Subsistence section of this chapter.

The State of Alaska has completed a Central/Southern Southeast Area Plan describing possible projects on State land in the southern portion of Southeast Alaska. Projects on State land adjacent to National Forest System land could increase the impact of cumulative effects from National Forest System land projects. There is no State land adjacent to the project area boundary.

## Effects on the Issues

The Council on Environmental Quality (CEQ) issues guidance to Federal agencies to determine the significant issues concerning any proposal, and to eliminate those issues that are not significant, or that are outside the scope of this document. With the help of the public and other agencies, we identified the four issues to be examined in detail for the proposed project. In the following sections, we describe the environmental effects of each of our alternatives as they relate to these four issues.

## Issue 1: Timber Economics

### Issue Statement: Timber harvest in the project area may affect the local and regional economies.

This project has the potential to affect employment and the economy of local communities. This was raised as an issue during public scoping. Public comments indicated concern about current changes in the timber industry. Some voiced strong support for timber harvest in the project area. Others expressed concern that a sale may not yield a net return to the Federal treasury ("below-cost sale"). The amount of wood harvested and any infrastructure developed with this entry may affect availability and costs associated with future entries for timber harvest.

### Affected Environment

#### Community Economic Base

#### Employment in Southeast Alaska

Approximately 80 percent of Southeast Alaska is within the Tongass National Forest, which extends 500 miles from Ketchikan in the southeast to Yakutat in the northwest. With little private land available, the region is sparsely settled. Approximately 74,000 people live in 33 towns and villages located in and around the Forest. The communities of Southeast Alaska depend on the Tongass National Forest to provide the foundation for natural resource-based industries, which include wood products, commercial fishing and fish processing, recreation, tourism, mining, and mineral development. Many residents also depend heavily on subsistence hunting and fishing to meet their basic needs. There is very little private land in the region to provide these resources. Appropriate management of the Tongass' natural resources is, therefore, extremely important for local communities and the overall regional economy. An overview of regional employment is provided in the Economics resource report in the Licking Creek project planning records.

#### Employment in the Project Area

Three communities near Carroll Inlet are directly affected by this project: Ketchikan and Saxman on Revillagigedo Island, and Metlakatla on Annette Island.

Ketchikan (population 13,900) is the 4th largest community in Alaska. Timber and fishing have been the economic foundation of the community; however, the Ketchikan Pulp Company, a major employer for 40 years, closed in 1997, and employment in the fishing and seafood industry has also declined in recent years. Today, the cornerstones of the Ketchikan economy include tourism, government, airport, and shipyard services in addition to commercial fishing and timber. Sport fishing and hunting are important recreational activities for area residents.

Saxman is immediately adjacent to Ketchikan and its economy is linked to the larger community. Saxman depends on the tourist industry generated in Ketchikan and on local subsistence resources.

The community of Metlakatla, on the Annette Island Indian Reservation, has recently lost several major sources of employment: the cannery and two sawmills. Metlakatla is currently planning a water-bottling plant and small forest product utilization at its mill site. The community continues to struggle with high unemployment and economic decline. Should the sawmill resume operation at some time in the future, small sales on National Forest System lands that they could qualify to bid on could provide jobs for the community. The people of Metlakatla are heavily dependent on subsistence resources.



# 3 Environment and Effects

## The Timber Industry

### Forest Products Employment

The forest products industry has been an important part of the economy of Southeast Alaska since the 1950s. Recent forest products employment data are presented in Table 3-1. From 1987 through 1996, the forest products industry provided direct employment for an average of 2,791 workers. Indirect employment, which includes related service activities such as transportation, marketing, and equipment sales and maintenance, provided an additional 2,014 jobs. Direct and indirect employment during this period peaked in 1990 with totals of 3,543 and 2,570 jobs, respectively.

Employment has dropped recently, primarily due to lower market conditions and the closure of the pulp mill in Ketchikan in 1997. With that closure, employment in this category has been reduced by approximately 520 jobs.

Table 3-1  
Forest Products Industry Employment in Southeast Alaska 1991 to 2000

Employment Type	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Logging	1,554	1,415	1,344	1,177	1,185	1,157	1,049	889	824	711
Saw Mill	604	538	447	515	301	230	184	284	303	280
Pulp Mill	911	910	859	533	516	524	318	96	63	2
<b>Total Direct Job Years</b>	<b>3,069</b>	<b>2,863</b>	<b>2,650</b>	<b>2,225</b>	<b>2,002</b>	<b>1,911</b>	<b>1,551</b>	<b>1,269</b>	<b>1,190</b>	<b>993</b>

Source: Forest Plan Final EIS, 1997; USDA Forest Service, 1998n, and AK Dept. of Labor 2000

### Timber Supply and Market Demand

Determining market demand is a complex process. An explanation of the overall rationale for considering timber harvest in the Licking Creek project area, market demand for wood products, and how this sale fits into the overall timber program for the Tongass, is located in Appendix A of this document. More information can also be found in the Forest Plan Final EIS, Part 1 (pages 3-248 to 3-307) to which this document is tiered.

The Tongass National Forest makes two determinations on volume to be offered. The first is a determination on volume to be offered for the current year (annual market demand). The annual market demand is analogous to assessing industry performance in the short-term. The general approach is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capability. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. Timber inventory requirements are acknowledged and estimated in a related calculation. The volume of timber likely to be purchased is equal to the volume needed to make up any inventory shortfall in addition to the volume likely to be harvested in the coming year. The document, *Evaluating the Demand for Tongass Timber* (Morse, 1998), forms the basis for how these estimates were developed. The document, *Tongass National Forest Sale Procedures* (Morse, 2000), documents the process used to determine the current fiscal year offer. The Regional Office annually updates actual estimates for each year. This estimate is what the Tongass plans to offer for the current year of the 10 Year Timber Sale Schedule, pending sufficient funding to do so. Final procedures can be located in *Responding to the Market Demand for Tongass Timber* (Morse, 2000).

Based on the analysis procedure documented in the *Tongass Timber Sale Procedures, Fiscal Year 2002*, the Tongass National Forest offering that is required to meet timber supply objectives is 146 MMBF. The offer planned will be a combination of new, previously offered, and previously offered and reconfigured timber sales. Both standing timber and salvage will be

components of the program. Offerings will consist of those targeted for Small Business qualified firms as well as a portion of the volume being made available for open market.

The second estimate that the Tongass National Forest makes regarding determinations on volume to be offered is the long-term. The basis for this estimate is the long-range timber market projections documented in *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes, 1997).

There are many variables that can increase the cost of timber sale offerings, and may carry significant economic risk for potential purchasers. High cost could be incurred as a result of road construction, helicopter logging, amount of timber volume and value of timber being removed. Market stumpage values must be sufficient to cover this cost and offer a profit for potential purchasers. The timber economics for the project have the potential to affect the timber supply to the forest products industry. It may also have an affect on employment in the local communities of Southeast Alaska.

Economic deferral (deferring a timber sale for economic reasons) is dependent on changing conditions that including log prices, the cost of accessing harvest units (roads), and the efficiency of harvest systems (including yarding and hauling costs).

In order to maintain a stable timber sale program, we need to provide a continuous flow of timber to the timber industry. The Forest Service has developed a timber sale program to respond to this need. The proposed Licking Creek Timber Sale is a necessary component of this program, and the sale is identified on the 10-year Timber Sale Plan.

## Environmental Consequences

### Direct and Indirect Effects

#### Projected Employment and Income

The action alternatives would have direct and indirect impacts to the economies of the local communities (Table 3-2). We estimated the amount of employment and income likely to result from timber harvest by converting board feet to jobs and income, using Forest Plan multipliers developed for Southeast Alaska. The Forest Plan Final EIS estimated that 5.28 direct jobs are generated per million board feet. Direct jobs are in logging, construction, marine transport, and sawmills. The following Table 3-2 displays direct logging-related employment and income.

Alternative 1 would not generate timber-related jobs.

Table 3-2  
Logging-related Employment and Income for each Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Employment<sup>1</sup></b>					
Direct Job Years	0	28	63	89	85
<b>Total Income (Millions \$)<sup>2</sup></b>					
Direct Income	0	1.26	2.80	3.95	3.80

<sup>1</sup> Job year/harvest ratios are from the Forest Plan.

<sup>2</sup> Woods products gross income estimates from the Forest Plan Final EIS, 1997, adjusted to 1998 dollars.

<sup>3</sup> Assumes export of yellow cedar

Source: Forest Plan, NEAT Analysis.

#### Opportunities for Small Sales

The timber volume in Alternatives 3, 4 and 5 could be separated into several smaller sales. Alternative 2 would be offered as one sale, due to the small volume and the associated move-in



# 3 Environment and Effects

costs of multiple sales. The Ketchikan-Misty Fiords Ranger District has an annual salvage and small sales program of approximately one million board feet.

## **Payments to the State of Alaska**

In previous years, 25 percent of the returns to the U.S. Treasury from revenue-producing Forest Service activities was returned to each State containing national forest lands and then distributed to counties (or, in Alaska, to Organized and Unorganized Boroughs) with national forest acreage within their boundaries. These were termed “25 percent fund payments” and were dedicated to schools and roads. More recently, in order to stabilize these payments in the face of declining Forest Service timber harvests and associated revenues, Congress enacted the Secure Rural Schools and Community Self-Determination Act of 2000. Under this Act, boroughs can elect to receive a “full payment amount,” which is the average of the highest three payments made between 1986 and 1999. The Act makes this option available through fiscal year 2006.

Under the full payment approach, Forest Service payments to the State of Alaska during the 2001-2006 period would not be directly linked to annual revenues, but instead, would be based on the historic “high 3-year” average. Total revenues during the 2001-2006 period are expected to be considerably less than this “high 3” average. Therefore, the full payment approach is the likely option for affected boroughs, and the difference in revenues across the planning alternatives will have no effect on the payments these boroughs receive.

## **Timber Financial Efficiency Analysis**

One way to compare the effects of the different alternatives is to conduct a financial efficiency analysis. Financial efficiency analysis is a comparison of those costs and benefits that can be quantified in terms of actual dollars spent or received within the project area. When considering quantitative issues, financial efficiency analysis offers a consistent measure in dollars for comparison of alternatives. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits, and costs that are not easily quantifiable, such as recreation. This is not to imply that such values are not significant or important, but to recognize that non-market values are difficult to represent by appropriate dollar figures. Therefore, financial efficiency should not be viewed as a complete answer but as one tool that decision makers use to gain information about resources, alternatives, and trade-offs between costs and benefits.

Although individual timber harvest units may or may not be economical to harvest by themselves, the management of less-productive land, or land containing a high percentage of defective timber, will help to increase future timber yields. The harvest of units with higher returns will help compensate for those less economical.

A preliminary appraisal was conducted for the action alternatives (Table 3-3, Harvest Economic Efficiency Analysis). This analysis was run using the NEPA Economic Analysis Tool (NEAT), which is based on the Transaction Evidence Appraisal method. The analysis compares estimated costs and determines an estimate of net stumpage values for high and low market conditions. Alternative 1 is not displayed because there is no harvest associated with it.

Harvest volumes were estimated for sawlogs that would be harvested. Due to market conditions, utility logs are not required to be removed during harvest operations. These volumes are based on field stand exam data, and the estimates are expected to vary from actual cruise volumes.

The expected bid rate for the last 15 quarters was used to display the action alternative’s ranking based on the alternative’s estimated timber quantity, quality and logging efficiency. These market scenarios are used to display the cyclical nature of timber markets. They are not intended to display a final appraised stumpage value.

Before any National Forest System timber is sold, it is appraised to estimate the material’s fair market value. When a sale is offered, it is offered competitively and the contract is normally

awarded to the firm offering the highest bid. These requirements have been imposed to help ensure that the government is justly compensated for any timber it sells.

For the Licking Creek Timber Sale, stumpage values were calculated for the action alternatives by including estimated stump to truck, transportation, logging overhead and road construction costs. The stumpage values do not include bid premiums that could result from competitive bidding for the timber when sold.

**Table 3-3**  
Harvest Economic Efficiency Analysis - Alternatives 2, 3, 4 and 5 Timber Sale Values and Costs to an Operator of Average Efficiency

<b>Volume</b>	<b>Alt. 2</b>	<b>Alt. 3</b>	<b>Alt. 4</b>	<b>Alt. 5</b>
Sitka Spruce	2,225	5,215	7,337	7,162
Hemlock	7,468	16,461	23,061	22,205
Western Red Cedar	232	403	652	513
Alaska Yellow Cedar	784	1,753	2,506	2,381
<b>Total CCF</b>	<b>10,709</b>	<b>23,832</b>	<b>33,556</b>	<b>32,261</b>
<b>Logging Cost per CCF</b>	\$171.47	\$155.08	\$130.64	\$162.78
<b>Expected Bid Value</b>	(\$383,090)	(\$394,186)	\$278,578	(\$753,807)
<b>Advertised Rate/CCF</b>	(\$35.77)	(\$16.54)	\$8.30	(\$23.37)

<sup>1</sup> ( ) indicates negative value

Source: D. Fletcher, NEAT, 2002

### Financial Efficiency Summary

The financial efficiency analysis for Alternative 2 produced an expected sale value of (\$383,090) for the current market condition. The expected advertised net stumpage rate would be (\$35.77) per CCF. The predominant reason Alternative 2 has a deficit value is due to the high logging costs associated with helicopter yarding coupled with the current low market condition. Almost 47 percent of the timber would be harvested by helicopter. Regardless of market scenario, the estimated harvest volume and logging costs remain constant. Management standards could be applied to this alternative to improve the economics. All alternatives have been appraised with a required removal to a 6-inch top diameter and domestic processing of western red cedar. The expected value could be increased for this alternative if appraised to a 12-inch top diameter and/or with export of the western red cedar.

The financial efficiency analysis for Alternative 3 produced an expected sale value of (\$394,186) for the current market condition. The expected advertised net stumpage rate would be (\$16.54) per CCF. The predominant reason Alternative 3 has a deficit value is due to the high logging costs associated with helicopter yarding coupled with the current low market condition. Almost 44 percent of the timber would be harvested by helicopter. Regardless of market scenario, the estimated harvest volume and logging costs remain constant. Management standards could be applied to this alternative to improve the economics. As stated above, the expected value could increase for this alternative if appraised to a 12-inch top diameter and/or with export of the western red cedar.

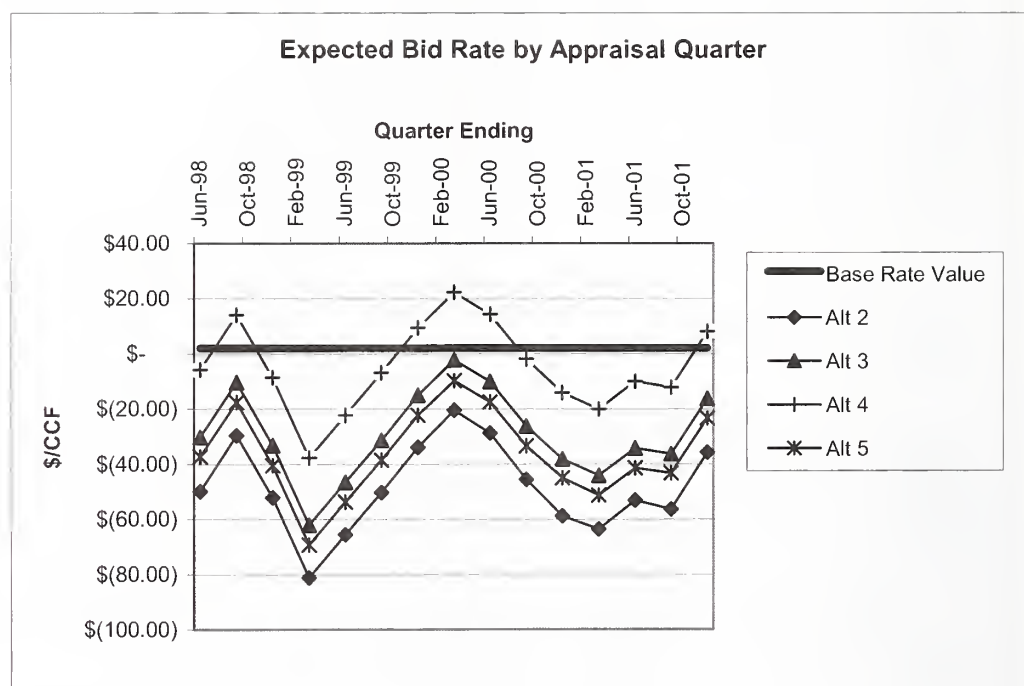
The financial efficiency analysis for Alternative 4 produced an expected sale value of \$278,578 for the current market condition. The expected advertised net stumpage rate would be \$8.30 per CCF. The predominant reason Alternative 4 is not deficit is due to the low logging costs of \$130.64 per CCF. Only 18 percent of the timber would be harvested by helicopter. Regardless of market scenario, the estimated harvest volume and logging costs remain constant.

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The financial efficiency analysis for Alternative 5 produced an expected sale value of (\$753,807) for the current market condition. The expected advertised net stumpage rate would be (\$23.37) per CCF. The predominant reason Alternative 5 has a deficit value is due to the high logging costs associated with helicopter yarding coupled with the current low market condition. Seventy-two percent of the timber would be harvested by helicopter. Regardless of market scenario, the estimated harvest volume and logging costs remain constant. Management standards could be applied to this alternative to improve the economics. As stated above, the expected value could be increased for this alternative if appraised to a 12-inch top diameter and/or with export of the western red cedar.

The estimated harvest volumes, expected value, costs and net stumpage values projected in this document at this time are not definitive figures. These estimates are useful for comparing the alternatives but should not be used for determining actual sale volume, costs or values. Merchantable timber within units and any road right-of-way located on National Forest System lands will be cruised to determine the quantity, quality and value of timber for the contract under which that volume of timber is offered. The final sale appraisal will include current quarter selling values, current cost information and a normal profit and risk allowance to determine the minimum advertised stumpage value at the time of offering. It should be noted that base rates to cover cost of essential reforestation and a small return to the National Treasury would be the minimum rates advertised for sales appraised deficit. Competitive bidding will determine the actual value.

Figure 3-1  
Expected Bid Rate by Appraisal Quarter



Source: D. Fletcher, 2002

The above chart displays Alternatives 2, 3, 4, and 5 with respect to the expected bid for the last 15 quarters beginning with June of 1998. The curve reflects the market conditions over the past 3 years. The bold black line in the middle of the chart depicts base rates, which are the minimal rates the Forest Service will accept for timber. Rates below this line are not expected



to sell under market conditions. Alternative 4 is positive or above base rates for 5 of the last 15 quarters. Alternatives 2, 3, and 5 are not positive during any of the last 15 quarters.

## **Opportunities to Improve Economics**

If Alternative 2 appraises deficit at the time of offer, management standards could be applied to the alternative to improve the economics. All alternatives have been appraised with a required removal to a 6-inch top diameter and domestic processing of western red cedar. Even if the western red cedar were exported and the utilization standard to a 12-inch top diameter were applied, the advertised rates for this alternative would still be negative (\$18.53) per CCF. This translates to a total sale value of (\$159,999). The reason this alternative remains deficit is due to the high logging costs and the high percentage of helicopter yarding.

If Alternative 3 appraises deficit at the time of offer, management standards could be applied to this alternative to improve the economics. All alternatives have been appraised with a required removal to a 6-inch top diameter and domestic processing of western red cedar. However, the expected value could be increased for this alternative if the utilization standards to a 12-inch top diameter were applied and the western red cedar was exported. The advertised rates would convert a positive value of \$4.91 per CCF. This translates to a total sale value of \$94,684.

If Alternative 5 appraises deficit at the time of offer, management standards could be applied to the alternative to improve the economics. All alternatives have been appraised with a required removal to a 6-inch top diameter and domestic processing of western red cedar. Even if the western red cedar were exported and the utilization standard to a 12 in top diameter were applied, the advertised rates for this alternative would still be negative (\$1.62) per CCF. This translates to a total sale value of (\$42,447). The reason this alternative remains deficit is due to the high logging costs associated with helicopter yarding.

## **Effects on Tongass Timber Supply**

The Licking Creek Timber Sale would have short-term and long-term effects to supply and demand of wood. There is the opportunity with this project to provide one to two timber sales within a 2-year period. The proposed roads would provide opportunities for future entries.

## **Public Investment Analysis**

Public investment analysis of each alternative compares the value of the timber with the cost of preparing the timber sale. The average Region 10 budget allocation costs and management expenses are subtracted from net stumpage revenues to determine net value. The costs and management expenses include environmental analysis, sale preparation, sale administration and engineering support. Forest Service cost per hundred cubic feet (CCF) is based on the Region 10 average budget allocation of \$20.50/CCF for analysis, \$11.50/CCF for sale preparation, \$4.50/CCF for sale administration and \$14.00/CCF for engineering support.

Environmental analysis costs include field inventory and the analysis of data, public involvement, and the preparation of a document that satisfies the requirements of the National Environmental Policy Act. The timeframe is about 2 years and involves many resource specialists. Although it is based on timber volume, the cost fluctuates more with the amount of area to be examined and the accessibility of that area. The Licking Creek project area is accessible by road and located on Revillagigedo Island. A Forest Service field camp is located near the project area to house District employees. Working from a field camp greatly reduces the cost of transportation to the area compared to other project areas. Most other areas are accessible only by helicopter, floatplane, or boat with no overnight facilities. The environmental analysis cost is constant and applies to all alternatives, including the No-action Alternative.

Unit layout and cruising costs increase significantly when partial harvest is prescribed, as compared to clearcutting. The Alternatives-to-Clearcutting Research Study on Kupreanof Island required about eight times more person-days to prepare a unit that involved marking individual trees throughout the unit compared to a clearcut unit. Designation of 2-acre patches took about four times longer than a clearcut. Accessibility to the units is another major cost

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factor. Helicopter access and steeper terrain increase sale preparation costs, as compared to areas with existing road access.

Using these cost factors, Alternative 2 would be the least costly to prepare because of the easy access from existing roads and the low volume associated with this alternative. Alternatives 3 and 5 would be the next least costly to prepare. Although Alternative 5 has more volume than Alternative 3, no additional roads would be constructed; as a result, engineering support would be less. Alternative 4 would be most costly to prepare because of the amount of volume and road construction associated with the alternative.

Sale administration costs are higher when helicopter logging is involved because of the increased cost of accessing the timber harvest for administration. Scattered and smaller harvest areas are more costly to visit. Because of the higher sale administration costs for helicopter yarding, Alternatives 3 and 5 would have higher costs than the other action alternatives. Alternative 4 would be the next most costly.

A Civil Rights Impact Analysis (CRIA) is used to identify any possible impacts associated with a proposed project based upon an individual's civil rights (religion, race, color, national origin, age, gender, disability, marital status, and political beliefs). We have no indication, nor received any comments, that suggest that the proposed project would impact any individual's civil rights. This conclusion tiers to the Economic and Social Environments Analysis included in Chapter 3 of the Forest Plan Final EIS.

## Cumulative Effects

### Alternative 1

No timber would be harvested for this project from the project area. Other timber sales that have been cleared and/or sold in the project area, such as Madder Timber Sale and Mop Point/91 Knot Timber sale, will still be harvested. In order to meet the estimated demand for timber, more timber may need to be harvested elsewhere on the Tongass National Forest.

### Alternatives 2, 3, 4 and 5

A stable timber economy depends on an even flow of timber that operators can depend on in order to make investments in machinery and to employ qualified workers. Timber from the Licking Creek Timber Sale would be one part of the timber supply available for public consumption. A stable timber supply in Southeast Alaska depends on the success of many timber sales across the Tongass National Forest. The amount of timber harvest that occurs also affects the availability of timber in the foreseeable future and contributes to the long-term timber supply. Timber from the project area has been contributing to the timber industry of Southeast Alaska since 1954, particularly since the early 1970s when roads were first built into the area. Since 1954, approximately 2,954 acres of timber have been harvested from the project area. In addition to providing timber access, the roads within the project area have been used to access second-growth stands for thinning within the current project area boundary. Other timber sales in the project area include Madder Timber Sale (seven units totaling 249 acres with 16,982 CCF (8,505 MBF) occur in the project area) and Mop Pt./91 Knot Timber Sale (one unit totaling 9 acres with 544 CCF, approximately 272 MBF). Madder Timber sale is planned for harvest by 2006, and Mop Pt./91 Knot is planned for harvest in 2004.



## Issue 2: Wildlife

### Issue Statement: Timber harvest may reduce wildlife habitat, which may affect deer and other wildlife populations.

The following analysis is tiered to the Wildlife section of the Forest Plan. Applicable direction is included in the 1997 Forest Plan, Chapters 3 and 4 and Appendix K, and the 1998 Tongass Land and Resource Management Plan Implementation Policy Clarification. Under the Forest Plan, old-growth habitat conservation is the core of the wildlife management strategy. Effects on old growth are discussed under Biodiversity and Old Growth, Chapter 3, of this EIS. Effects on Threatened, Endangered and Sensitive Species, including the northern goshawk, are presented in that respective section in this chapter. Effects on other wildlife species (called Management Indicator Species) are discussed here. Additional information is available in the unit and road cards (Appendix B), and in the Wildlife resource report, located in the Licking Creek project planning record.

#### Wildlife Habitats

Alaska wildlife species are valuable for ecological, subsistence, aesthetic, economic, and recreational reasons. Over 350 species of birds, mammals, amphibians, and reptiles occur within the Tongass National Forest (Forest Plan Final EIS). Many of these can be found within the Licking Creek project area. They occupy a diverse range of habitat and are variably adapted to climatic extremes, changes to habitat, predation, and hunting pressure.

Wildlife species depend on a variety of forest structure to meet their habitat needs. Although each action alternative proposes to harvest forested wildlife habitat, Forest Plan Standards and Guidelines protect some key habitats. These include old-growth habitat within Old-growth Reserves (OGRs), riparian habitats on all Class I, II and III streams, all beach and estuary fringe habitats, high-value American marten (*Martes americana*) habitat, and other areas unsuitable for timber harvest.

Currently, about 48 percent of the project area is in an undeveloped condition. Productive old growth (POG), old-growth stands at low elevations (below 1,500 feet), and old-growth stands with a coarse canopy are important habitats for wildlife species in Southeast Alaska (Forest Plan Final EIS). Productive old growth has at least 8 MBF of timber volume per acre. Old-growth stands with a coarse canopy provide a high level of snow interception and are especially beneficial during the winter (Caoquette, 2000). These old growth habitats are specifically discussed in the Biodiversity and Old Growth section in this chapter.

Wildlife Analysis Areas (WAAs) are used by Alaska Department of Fish and Game (ADF&G) for data collection purposes and by the Forest Service for wildlife analysis purposes. The Licking Creek project area occurs within WAA 406 and Value Comparison Unit (VCU) 7460 (see Figure 3-6 in the Biodiversity and Old Growth section in this chapter).

#### Management Indicator Species

Management Indicator Species (MIS) are those wildlife species whose responses to land management activities are thought to reflect the likely responses of other species with similar habitat requirements. Under the MIS concept, the responses to management activities of a relatively few species are studied and monitored, in order to predict the impacts to entire assemblages of species and associated habitats. They are also used to help establish management goals for game species and other species of public interest. Sitka black-tailed deer, Alexander Archipelago wolf, and American marten were selected as MIS species because they are most likely to be significantly impacted by timber harvest activities in the Licking Creek project area.

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#### Management Indicator Species

Alexander Archipelago wolf

Sitka black-tailed deer

American marten

#### Basis for Selection

Population concerns, furbearer and game species

Represents range of forested habitat and important subsistence and game species

Represents high-volume old-growth forest

The following species are identified as Tongass National Forest MIS, but were not selected as Licking Creek project MIS. The rationale is summarized below, and further discussed in the Wildlife resource report (in the project planning record).

#### Management Indicator Species

river otter, Vancouver Canada goose,  
black bear, bald eagle

hairy woodpecker

mountain goat

brown bear

red-breasted nuthatch

#### Basis for Non-selection

Primary habitat protected by Forest Plan Standards & Guidelines. No harvest of these habitats proposed in the Licking Creek project area.

Habitat protected under Forest Plan Standards & Guidelines for Old-growth Reserves and high-value marten habitat.

Incidental use of project area

Does not normally occur in project area.

Abundant and adaptable in project area

### Wildlife Habitat Capability Models

Interagency wildlife models were used as a planning tool to calculate habitat capability for deer, wolf, and marten within the project area. The models provide relative values that are used to compare habitats and potential impacts among timber harvest alternatives.

An interagency model (Suring et al. 1992), developed to evaluate potential winter habitat capability (carrying capacity) for deer, was updated for the 1997 Forest Plan revision. The model calculates habitat suitability indices (HSIs), based on timber volume strata (high, medium, low - see Volume Classification and Table 3-31 in the Silviculture and Timber Management section in this chapter for a description), aspect, elevation, and typical snowfall. HSI values range from 0.0 to 1.0. An HSI score of 1.0 is multiplied by 100 deer per square mile to estimate the theoretical number of deer that the habitat may support. (These results do not represent actual numbers of deer and are used for comparison purposes only.) The number of deer per square mile and the amount of land in the top-scoring habitat are then compared at appropriate scales of analysis (usually project area, VCU, and WAA), and compared to recommended minimums that account for predation by wolves and bears and human harvest. (These are discussed in the Alexander Archipelago wolf section under Affected Environment.)

Another model (Suring et al. 1992) was developed to evaluate marten habitat capability and to estimate potential impacts of timber harvest. The model calculates HSI based on timber volume strata (high, medium, low), elevation, and typical snowfall. HSI values range from 0.0 to 1.0, and are multiplied by 2.71 marten per square mile to estimate the number of marten that the area may support.

The terms "habitat capability" and "populations" are not synonymous. Habitat capability is the estimated number of animals the habitat can support through critical times of the year. Population size is the estimated number of animals actually present at a specific time. Populations can change over time for reasons other than changes in habitat (such as disease,

predation, hunting harvest or severe winter mortality), so that actual population sizes may vary considerably from those predicted by the model. Consequently, the model is best used to compare the potential effects of proposed management on habitat for these species, and the trends in population size we could expect to occur from these changes.

## Affected Environment

### Sitka Black-tailed Deer

Sitka black-tailed deer was chosen as a MIS because it is an important game and subsistence species and because it is associated with old-growth forests. Sitka black-tailed deer receive the highest subsistence and sport hunting use of all terrestrial species in Southeast Alaska. Research conducted in Southeast Alaska indicates that low-elevation, high-volume productive old-growth habitats with southern aspects and in low snowfall areas are particularly important to deer, especially during severe winters (Schoen et al. 1985, Hanley and Rose 1987, Yeo and Peek 1992, Forest Plan Final EIS). These mature old-growth stands intercept snow, provide thermal cover, and support the largest biomass of herb and shrub forage for deer (Alaback 1982).

Using the deer habitat model, we estimated the current habitat capability of the project area to be 67 percent of historic levels (Table 3-4). (Historic levels are defined as conditions that existed prior to initiation of timber harvest in 1954). For WAA 406, existing capability is 81 percent of historic levels.

Hunter harvest is tracked by ADF&G at the WAA scale. A deer population at carrying capacity should be able to support an annual hunter harvest of approximately 10 percent that is sustainable, and ensure that a reasonably high percentage of hunters are successful. The number of successful hunters can be expected to decline in areas where harvest represents 10 to 20 percent of habitat capability. If harvest exceeds 20 percent of habitat capability, harvest of deer by hunters may be directly or indirectly restricted (Forest Plan, Final EIS). Hunters harvested an estimated average of 94 deer annually from WAA 406 (ADF&G, deer harvest data) during 1996 to 2001. This is approximately 3 percent of the deer habitat capability for the WAA during this period.

### Alexander Archipelago Wolf

The Alexander Archipelago wolf is a subspecies of the gray wolf. In Southeast Alaska, they inhabit the mainland and most large islands south of Frederick Sound. Person et.al. (1996) estimated the population at about 900 individuals. Approximately 200 to 250 are harvested annually in Southeast Alaska (Kirchhoff 1991, D. Person), with the majority taken along the shoreline from boats (Person et.al. 1996). Between 1995 and 1999, 18 wolves (averaging 3.6 per year) were legally harvested from WAA 406.

Sitka black-tailed deer are the principal prey of Alexander Archipelago wolves, and long-term viability of wolves is dependent on long-term deer habitat capability (Forest Plan Final EIS, Appendix N). Three key issues influence wolf populations in Southeast Alaska: 1) the loss of long-term carrying capacity for deer, primarily from timber harvest, 2) higher wolf mortality associated with increased human access from roads, and 3) continued high levels of wolf harvest by humans (Person et al. 1996). Similarly, the Forest Plan identified the maintenance of adequate deer habitat capability and the control of road density and human access as key factors important for maintaining viable, well-distributed wolf populations (Forest Plan Final EIS). Both sources agreed that maintaining long-term deer habitat capability is the most important factor in maintaining wolf populations.

Forest Plan Standards and Guidelines state that 13 deer per square mile are needed to support both wolves and hunter demand. The Forest Plan Implementation Policy Clarification (1998) states that an average habitat capability of 17 deer per square mile is needed over the long term to maintain an actual density of 13 deer per square mile. Person et al. (1996) recommended that, in areas where wolves prey primarily on deer, adequate habitat to support 18 deer per square mile should be maintained to provide for current levels of deer harvest by both wolves



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and hunters. Densities of 100 deer per square mile and no predation factor were used in this analysis.

Prior to any timber harvest, the project area had an estimated habitat capability of 29 deer per square mile (Table 3-4). Current habitat capability at all scales (project area, VCU, and WAA) is estimated to meet or exceed the recommended capacity of 17 deer per square mile.

Table 3-4  
Pre-Harvest and Existing Total Deer Densities in the Licking Creek Project Area<sup>1</sup>

	Deer Densities per Square Mile		
	Project Area	VCU 7460	WAA 406
Year 1954	29	29	21
Existing	19	22	17

<sup>1</sup>Densities of deer were based on estimated numbers of deer, as calculated by the Interagency Deer Model.  
Source: J. Llanos, 2001

#### Effects of Prior Road Construction

Roads can also impact populations of deer and wolves. Roads may increase both legal harvest and illegal poaching of wildlife (Forest Plan Final EIS). Person et al. (1996) reported that wolves experienced higher mortality from hunting and trapping in WAAs with higher road densities, and that harvest of wolves by humans increased sharply in WAAs where road density exceeded 0.5 miles per square mile. This relationship is stronger where road systems are highly connected to other road systems or to human population centers (Person, unpublished data).

The Forest Plan directs that reducing open road densities to 0.7 to 1.0 mile per square mile may be necessary in areas where road access contributes significantly to wolf mortality concerns. Currently, road densities are 0.3 mile per square mile in WAA 406 (see Table 3-6). Alternative 4, which proposes the most road construction, would increase the open road density during project implementation to 0.4 mile/square mile. This is still below the recommended level of 0.7 to 1.0 mile per square mile. New roads would be closed after the project is completed. Between 1995 and 1999, 18 wolves were legally harvested from WAA 406.

The Forest Plan directs that wolf dens be protected from disturbance. No wolf dens have been identified within the project area. Should one be identified, a 1,200-foot buffer of no timber harvest, and a 600-foot buffer of no road construction, would be implemented around the den.

#### American Marten

American marten was selected as a MIS to represent old-growth associated species and because it is an important furbearer. American marten historically occurred on the mainland of Southeast Alaska and on Kuiu, Kupreanof, and Revillagigedo Islands. Between 1930 and 1950, marten were transplanted to Baranof, Chichagof, and Prince of Wales Islands. Like deer, marten are dependent on high-quality winter habitat, which consists of low-elevation, high-volume old-growth forest, especially in beach fringe and riparian areas. These habitats intercept snow, provide cover and denning sites, and provide habitat for prey species.

Using the marten habitat model, we estimate that the current habitat capability within the project area is 59 percent of the habitat capability that existed prior to any timber harvest in 1954 (Forest Plan Final EIS). See Table 3-7.

#### Other Wildlife Species

The Forest Plan requires an evaluation of the existence of rare or endemic terrestrial mammals that may represent unique populations with restricted ranges. No surveys were conducted specifically for this project. However, researchers from the University of Alaska Museum, Fairbanks, conducted numerous surveys on the Ketchikan-Misty Fjords Area between 1993 and 1999 (McDonald and Cook 1999). Although none were trapped, there is potential for the occurrence of northern flying squirrels (*Glaucomys sabrinus*) and ermine (*Mustela erminea*) in



the project area (A. Runck). Northern flying squirrels are discussed below. Viability discussions in the Forest Plan rated vulnerability of ermine habitat as low due to a limited association with old growth (Forest Plan EIS); therefore, the proposed project is not anticipated to have a substantial effect and ermine are not discussed further. Mink (*Mustela vison*) and river otters (*Lutra canadensis*) have also been observed in the Licking Creek project area. Primary habitat for these species is protected under Beach and Estuary Fringe and Riparian habitat designations. Effects on these species are expected to be minor. Band-tailed pigeons, considered rare in Southeast Alaska, have been sighted in the project area; they are discussed below.

## **Northern Flying Squirrel**

This species is considered a true old-growth associate and was identified as a viability concern in the Forest Plan. Flying squirrels are nocturnal and therefore, may be more abundant than casual surveys indicate. Old-growth Reserves were considered to best meet overall habitat needs and small Old-growth Reserves should support well-distributed populations capable of interacting across landscapes (Forest Plan). Beach, estuary, and riparian management areas provide valuable habitat and dispersal corridors to maintain connectivity and allow interaction.

## **Band-tailed Pigeon**

This species was identified as a species of special interest because Southeast Alaska is the northern periphery of its range. Few records exist for the Ketchikan area. During field surveys in 2001, a flock was observed near the coast, west of the main road between the mouths of Calamity and Marble Creeks. They were observed some years earlier in this same area during field surveys for the Sea Level EIS. A pair was also seen adjacent to the proposed Licking Creek Units 10 and 11. Recent Pacific coastal population declines are believed to be related to widespread habitat alteration and specifically the replacement of old-growth forest by even-age monocultures of fast-growing conifers (TNC Element Stewardship Abstract – Band-tailed pigeon, [www.conserveonline.org](http://www.conserveonline.org)).

## **Marbled Murrelets**

Marbled murrelets were identified as a species of concern in the Forest Plan. Although populations are relatively abundant in Alaska, the species is listed as threatened by U.S. Fish and Wildlife Service (USFWS) in California, Oregon, and Washington and as threatened by the Province of British Columbia. In Southeast Alaska, murrelet detections were greater in high-volume old growth. Surveys were conducted for murrelets during the Sea Level EIS. Although no nests were found, most of the area was identified as potential nesting habitat. Marbled murrelets prefer low-elevation forest near the coast (DeGange 1996). OGRs, beach/estuary fringe, and riparian buffers form the core of conservation habitat within the project area. Larger blocks of suitable habitat are also available within non-development LUDs and adjacent Misty Fjords National Monument.

# Environmental Consequences

## **Direct and Indirect Effects on Deer**

We used the deer habitat model to estimate the potential effects of the action alternatives on deer habitat capability. The model assumes that all timber harvest is accomplished using traditional even-aged (clearcut) silvicultural prescriptions, and that the habitat capability declines after harvest. Although clearcutting may result in a short-term increase of available forage for deer, the forage has reduced nutritive value (lower levels of digestible proteins) and, because of snow accumulation in openings during winter and early spring, is often unavailable to deer at the most critical time of year (Forest Plan Final EIS). Additionally, the regenerating tree canopy closes 25-35 years after harvest, and most forage plants for deer disappear. This “stem exclusion” stage can persist for over 100 years (Forest Plan Final EIS, Appendix N). Although precommercial thinning can delay canopy closure by 10-15 years, the benefits of thinning on forage appear to be temporary (Schoen et al. 1988, Person et al. 1996), and only a portion of harvested acres have been thinned.

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In this project, less than 5 percent of the harvest acres would be harvested under uneven-aged prescriptions (see Silviculture and Timber Management, Table 3-35). Although the effects of these alternative harvest methods on deer habitat capability are currently unknown, they probably have less impact than clearcutting, and the model may overestimate the reductions in habitat capability on these acres after timber harvest.

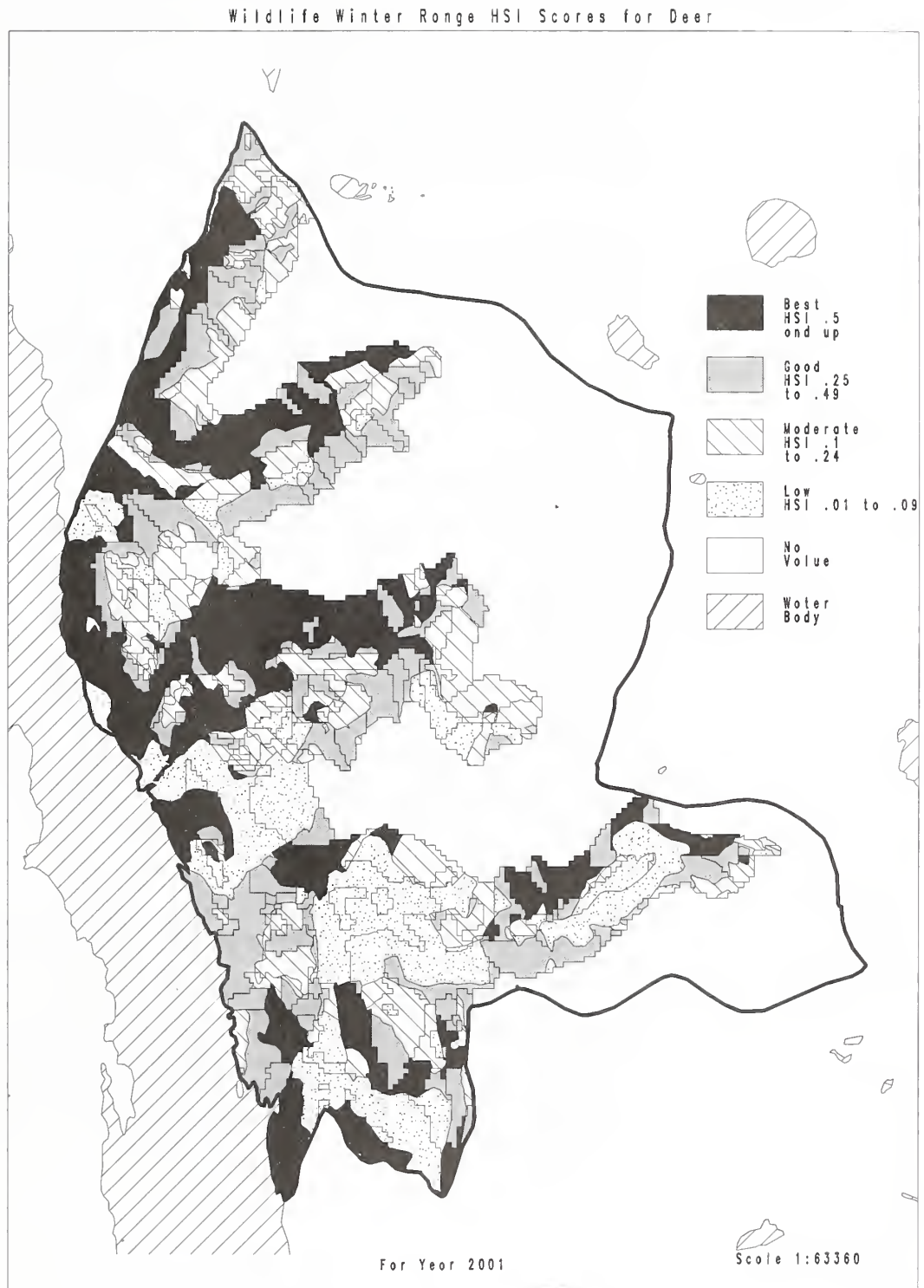
Using the deer habitat model, we estimate that the proposed timber harvest in the action alternatives would reduce habitat capability in the project area by 2 to 8 percent and in WAA 406 by 1 percent or less (Table 3-5). Alternative 2 would have the least impact on habitat capability and Alternative 4 the greatest. Currently, the reduction in the project area since 1954 is approximately 33 percent. The action alternatives (Alternatives 2 through 5) range from 34 percent to 39 percent overall reduction since 1954 (see Table 2-2 in Chapter 2).

The average estimated harvest of deer by hunters, as described in the Affected Environment section, is currently less than 3 percent of the estimated habitat capability. At this level, there should be a high number of successful hunters. Access to WAA 406 and the project area is via boat, and hunting is done on foot or four-wheeler. Timber harvest activities would contribute a few additional hunters from logging camps into adjacent areas during the active phase of the sale. New road construction may somewhat increase the annual harvest of deer by expanding the existing access, but would not bring more hunters into the area. (See additional discussion in the Subsistence section of this chapter.)

## **Habitat Suitability Index Scores on the Project Area**

A habitat suitability index (HSI) score of 1.0 is considered capable of supporting 100 deer per square mile. This is used as a reference point for ranking the habitat capability (for comparison only) and does not represent actual numbers of deer. Of the land base in the project area assigned some value to deer (59 percent of the project area), approximately 25 percent had HSI scores from 0.5 to 1.0 (Figure 3-2). Alternative 2 would have the least impact on this highest-quality habitat (2-percent reduction in acres and habitat capability following harvest) while Alternative 4 would have the greatest impact (12 percent reduction in acres and a 9 percent reduction in habitat capability following harvest). Alternative 5, would also harvest approximately 12 percent of the highest-quality acres, but would only reduce the overall capacity by 5 percent. Alternative 3 would harvest 5 percent of the highest-quality habitat (and yield a 4 percent reduction in the habitat capability).

Figure 3-2  
Licking Creek Project Area Deer Habitat Capability (Habitat Suitability Index)



/fsfiles/office/gis/licking\_creek/gis\_req/for\_todd/plotvol.aml

Source: J. Llanos, GIS, 2002

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#### Direct and Indirect Effects on Alexander Archipelago Wolf

For the purposes of project area wolf habitat analysis, habitat capabilities calculated from the deer model and expressed as theoretical deer per square mile are discussed here.

All alternatives would maintain habitat capability, at the project level, above the recommended density of 17 deer per square mile, as recommended in the Forest Plan Implementation Policy Clarification (Table 3-5). Alternative 2 would have the least impact on habitat capability, showing a 2 percent reduction. Alternatives 3 and 5 would reduce the habitat capability by approximately 4 and 5 percent, respectively. Alternative 4 would have the most impact (about 8 percent), but still meets the recommended level of 17 deer per square mile. At the WAA level, all alternatives would maintain approximately the existing habitat capability.

Table 3-5  
Effects of Proposed Timber Harvest on Deer Densities in Licking Creek Project Area and Vicinity<sup>1</sup>

	Approximate Deer Densities per Square Mile <sup>2</sup>	
	Project Area	WAA 406
Year 1954	29	21
Existing	19	17
Alternative 1	19	17
Alternative 2	19	17
Alternative 3	19	17
Alternative 4	18	17
Alternative 5	19	17

<sup>1</sup>Deer numbers were based on modeled Habitat Suitability Indices (HSIs); HSI = 1.0 represented 100 deer per square mile.

<sup>2</sup>These densities are presented for comparison purposes only; they **do not** reflect actual, known numbers of deer.

Source: J. Llanos, 2001, 2002

These modeled results are based on the assumption that all acres would be subject to clearcut harvest. Some of the acres (less than 5 percent) would be harvested using uneven-aged harvest prescriptions. Consequently, it is likely that the impacts would be somewhat less than was predicted.

#### Road Impacts on Wolves

Many studies show that wolf abundance may be inversely correlated with open road density (Person, D.K., M. Kirchhoff, V. Van Ballenberghe, G.C. Iverson, and E. Grossman, 1996.). Forest Plan Standards and Guidelines direct that open road densities of 0.7 to 1.0 may be needed to reduce mortality to acceptable levels (Forest Plan).

WAA 406 was selected as the appropriate landscape scale for road density thresholds for the Licking Creek analysis. Current road densities in WAA 406 are 0.3 miles per square mile (Table 3-6), which is well below the Forest Plan guidance of 0.7 mile per square mile. All new roads would be closed within 3 years after timber harvest activities are complete. We are also consulting with ADFG to determine if wolf mortality due to road density is of concern in the project area.



**Table 3-6**  
Open Road Miles (Existing, Scheduled and Proposed) and Open Road Densities for WAA 406 by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of existing open road <sup>3</sup>	66.0	66.0	66.0	66.0	66.0
Miles of proposed road construction (Sea Level EIS)	10.2	10.2	10.2	10.2	10.2
Miles of proposed road construction for Licking Creek project area <sup>2</sup>	0	1.5	2.2	5.5	0
Open road density during project implementation <sup>1</sup>	0.4	0.4	0.4	0.4	0.4
Existing and post-harvest open road density	0.3	0.3	0.3	0.3	0.3

<sup>1</sup> Road densities calculated as linear miles of road per square mile of land.

<sup>2</sup> This includes both classified and temporary road.

<sup>3</sup> Existing open road are currently driveable.

Source: J. Llanos, 2002

Since access to the project area is via boat, new road construction would not be expected to increase the number of hunters within the project area. There may be a few additional hunters from logging camps during active timber harvest. New roads would expand access into more remote areas, and may increase the harvest of wolves for a few years within WAA 406, until all new roads were closed. However, the total road density during the peak of activity would remain below recommended levels. By maintaining deer capability at or above the recommended minimum level at the WAA level, and maintaining road densities below the recommended minimum at the WAA level, we expect wolf populations in the area to be sustainable over the long term.

## Direct and Indirect Effects on American Marten

The Licking Creek project area is within a high-risk province for marten habitat (Forest Plan Final EIS). In such areas, timber harvest units that contain high-value marten habitat must meet specific Forest Plan Standards and Guidelines. (These are described in Chapter 2 under Mitigation.) The Forest Plan set the VCU as the appropriate scale of analysis for this species.

The marten habitat model assumes that all timber harvest is accomplished using traditional even-aged (clearcut) silvicultural prescriptions. Although the effects of alternative harvest methods on marten habitat capability are currently unknown, they probably have less impact than clearcutting, and the model may overestimate the reductions in marten habitat capability for these acres after timber harvest.

Based on the marten habitat model, we estimate that 3,780 acres of high-value marten habitat is currently within the project area (Table 3-7). The proposed timber harvest in the action alternatives would reduce this habitat capability by four to 15 percent within the project area and by 2 to 7 percent within VCU 7460. Alternative 2 would have the least effect on habitat capability and Alternative 5 the greatest.

Table 3-7  
Effects of Proposed Timber Harvest on American Marten Habitat Capability in the Licking Creek Project Area

	Marten Habitat Capability (acres) <sup>1</sup>	
	Project Area	VCU 7460
Existing	3,780	7,759
Alternative 2	3,624	7,603
Alternative 3	3,371	7,350
Alternative 4	3,250	7,229
Alternative 5	3,217	7,196

<sup>1</sup>These numbers are presented for comparison purposes only; they are based on acres of timber within the High Volume Strata categories (see discussion under Forested Vegetation.)

Source: J. Llanos 2001, 2002; treatment acres from S. Spores 2002

## Road Impacts on American Marten

Marten are easily trapped and can be over-harvested, especially where trapping pressure is heavy and not effectively controlled. This corresponds closely to the availability of road access. Because of their susceptibility to trapping, marten densities decline in areas where road densities exceed 0.2 mile of road per square mile. Marten densities may be reduced by as much as 90 percent when road densities approach 0.6 mile per square mile (Suring et.al.1992). Alternatives 2, 3, and 4 propose construction of approximately 1 to 5 miles of new road (including both classified and temporary roads). Including both the Licking Creek and Sea Level projects, this would result in road densities of 0.9 to 1.0 mile per square mile for VCU 7460 during project implementation (Table 3-8). All new roads would be closed within 3 years of completion of timber harvest, and open road densities would return to pre-harvest levels of 0.8 mile per square mile in VCU 7460. Alternative 5 proposes no new roads and would not have an effect on open road density. Marten harvest levels are currently low and are not expected to change significantly, because access to the project area is by boat or plane. None of the roads are connected to the Ketchikan road system and road use is limited to foot travel or four-wheeler. Therefore, even though road densities are fairly high, road effects on trapping pressure in the VCU are expected to be minimal.

Table 3-8  
Open Road Miles and Open Road Densities for VCU 7460 by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of existing open road <sup>3</sup>	39.0	39.0	39.0	39.0	39.0
Miles of proposed road construction (Sea Level EIS)	4.1	4.1	4.1	4.1	4.1
Miles of proposed road construction for Licking Creek project area <sup>2</sup>	0	1.5	2.2	5.5	0
Open road density during project implementation <sup>1</sup>	0.9	0.9	0.9	1.0	0.9
Existing and post-harvest open road density	0.8	0.8	0.8	0.8	0.8

<sup>1</sup>Road densities calculated as linear miles of road per square mile of land.

<sup>2</sup>This includes both classified and temporary road.

<sup>3</sup>Existing open road are currently driveable.

Source: J. Llanos, 2002

## Direct and Indirect Effects on Other Wildlife Species

### Northern Flying Squirrel

This species is considered an old-growth associate and was identified as a viability concern in the Forest Plan. Old-growth Reserves were considered to best meet overall habitat needs and small Old-growth Reserves should support well-distributed populations capable of interacting across landscapes (Forest Plan). Beach, estuary, and riparian management areas also help to maintain connectivity and allow interaction. Other than these reserve areas, impacts to northern flying squirrel would be proportionate to the amount of productive old growth harvested (see Biodiversity section). Standards and Guidelines for marten that retain 10-20 percent of the original stand structure may also provide limited habitat within the project area.

### Band-tailed Pigeon

Band-tailed pigeons are linked to old-growth habitat. They are known to be secretive nesters and may therefore be more plentiful in an area than commonly believed. Additional surveys were completed in 2002 to try to determine the extent of band-tailed pigeons in the areas around Licking Creek Unit 11, but no sightings were recorded. In a worst-case scenario, habitat can be expected to be reduced in proportion to the amount of old-growth forest harvested. This translates to a cumulative 25 to 27 percent reduction in VCU 7460 since 1954 conditions. Alternative 2 would reduce habitat the least of the action alternatives and Alternative 4 the most.

### Marbled Murrelet

Habitat would be reduced under the action alternatives as high-volume old growth is clearcut. Fragmentation/increased edge effect may also decrease habitat for murrelets. Marten Standards and Guidelines for reserve trees may maintain some habitat within harvested stands. This would be dependent upon the location, patch size and density of the reserve trees. The proposed timber harvest in the action alternatives would reduce current habitat by 4 to 15 percent within the project area, by 2 to 7 percent within VCU 7460, and by 1 to 2 percent within WAA 406. Alternative 2 would have the least impact on habitat capability and Alternative 5 the greatest. No nests have been identified in the project area.

## Cumulative Effects

### Alternative 1

Habitat capability for deer, wolf, marten and other wildlife would be reduced by the Madder and Buckdance Timber Sale units, which have been sold and are scheduled to be harvested. The Mop Point/91 Knot Timber Sales would not have an appreciable effect on habitat capability at the project area or landscape scale. Deer and marten habitat capability would slowly improve over time as re-growth occurred in previously harvested units. Deer numbers would continue, for the foreseeable future, to be above the minimum recommended density to maintain wolf populations at the project area level. Road densities in WAA 406 would be within the recommended levels for wolves. Road densities for marten are above recommended levels, but effects of trapping are low since access to the area is by boat.

### Alternatives 2, 3, 4 and 5

Habitat capability for deer, wolf, marten and other wildlife would be reduced by the Madder and Buckdance Timber Sale units, and further reduced by the action alternatives. The Mop Point/91 Knot Timber Sales would not have an appreciable effect on habitat capability at the project area or landscape scale. Of the Licking Creek action alternatives, Alternative 2 would have the least effect, and Alternative 4 the greatest. Deer and marten habitat capability would continue to be reduced below historic levels. They would slowly improve over time as re-growth occurred in previously harvested units and "stem exclusion" effects diminished. Deer densities to support wolf populations and current harvest levels would be reduced, but this effect would not be substantial at the WAA level. Densities would continue to meet the recommended 17 deer per square mile at the project, VCU, and WAA levels for the foreseeable future. Hunter demand in the area is a small percentage of the habitat capability, and is not expected to be significantly impacted by this project.

New road construction is scheduled to occur in WAA 406 under three timber sales analyzed in the Sea Level EIS; these have been sold, and timber harvest would be completed by 2006. The



## 3 Environment and Effects

cumulative effect of road construction for these sales and the Licking Creek action alternatives would also remain well below the Forest Plan threshold of 0.7 to 1.0 mile per square mile for wolves. All new roads would be closed within 3 years after timber harvest for both the Madder and Buckdance timber sales and proposed Licking Creek sales, and post-harvest open road densities would return to pre-harvest levels. Road densities in WAA 406 would be well within the recommended levels for wolves. However, new roads would expand access into more remote areas, and may increase hunter success. The cumulative effects of these influences may increase the harvest of wolves for a few years within WAA 406, until all new roads were closed. Road densities for marten are above recommended levels and would be increased during project implementation. They would return to pre-harvest levels shortly after project completion. Access to the area is by boat, and while the additional road surface may provide easier walking, trapping pressure is expected to remain fairly stable.

## Issue 3: Watersheds and Fish Habitat

**Issue Statement: Water quality and fish habitat may be affected by the cumulative effects of past and proposed timber harvest and road construction.**

This section summarizes fish and water data collected in the Licking Creek project area, and analyzes the effects of proposed harvest areas and road locations on water quality and fish habitat. This was identified as an issue by the Interdisciplinary Team due to the existing level of timber harvest in the project area watersheds. We used updated geographic information system (GIS) data to help quantify the amount of critical fish habitat. We used data gathered during the 2000, 2001, and 2002 field seasons to refine the unit boundaries and identify stream courses that need protection. This approach is in accordance with the Forest Plan.

### Affected Environment

#### Watersheds

The Licking Creek project area was delineated into seven watersheds (Table 3-9, Figure 3-3), according to National Hydrologic Unit Codes (HUCs) (D. Kelliher et. al. December 2000). For analysis, three small first-order watersheds were combined into Unnamed (00).

All of the project area watersheds are U-shaped valleys, longer than they are wide. The ridges separating them average 2,500 feet in elevation, and reach up to 3,800 feet on the eastern boundary of the project area. The distances between ridge tops do not exceed 3 miles in any of the watersheds. All of the streams drain west-southwest into Carroll Inlet.

Table 3-9  
Project Area Watersheds<sup>1</sup>

Watershed Name	Size (acres)	Size (sq. miles)	Stream Miles	MMI 3 or 4 Soils <sup>2</sup> (%)
Unnamed (00)	688	1.1	1.3	57%
Licking Creek (08)	4,107	6.4	21.4	65%
Unnamed (13)	573	0.9	3.8	43%
Calamity Creek (14)	4,231	6.6	19.8	50%
Unnamed (19)	829	1.3	6.7	59%
Marble Creek (20)	3,721	5.9	17.8	54%
Easy Creek (21)	3,871	5.9	23.8	54%

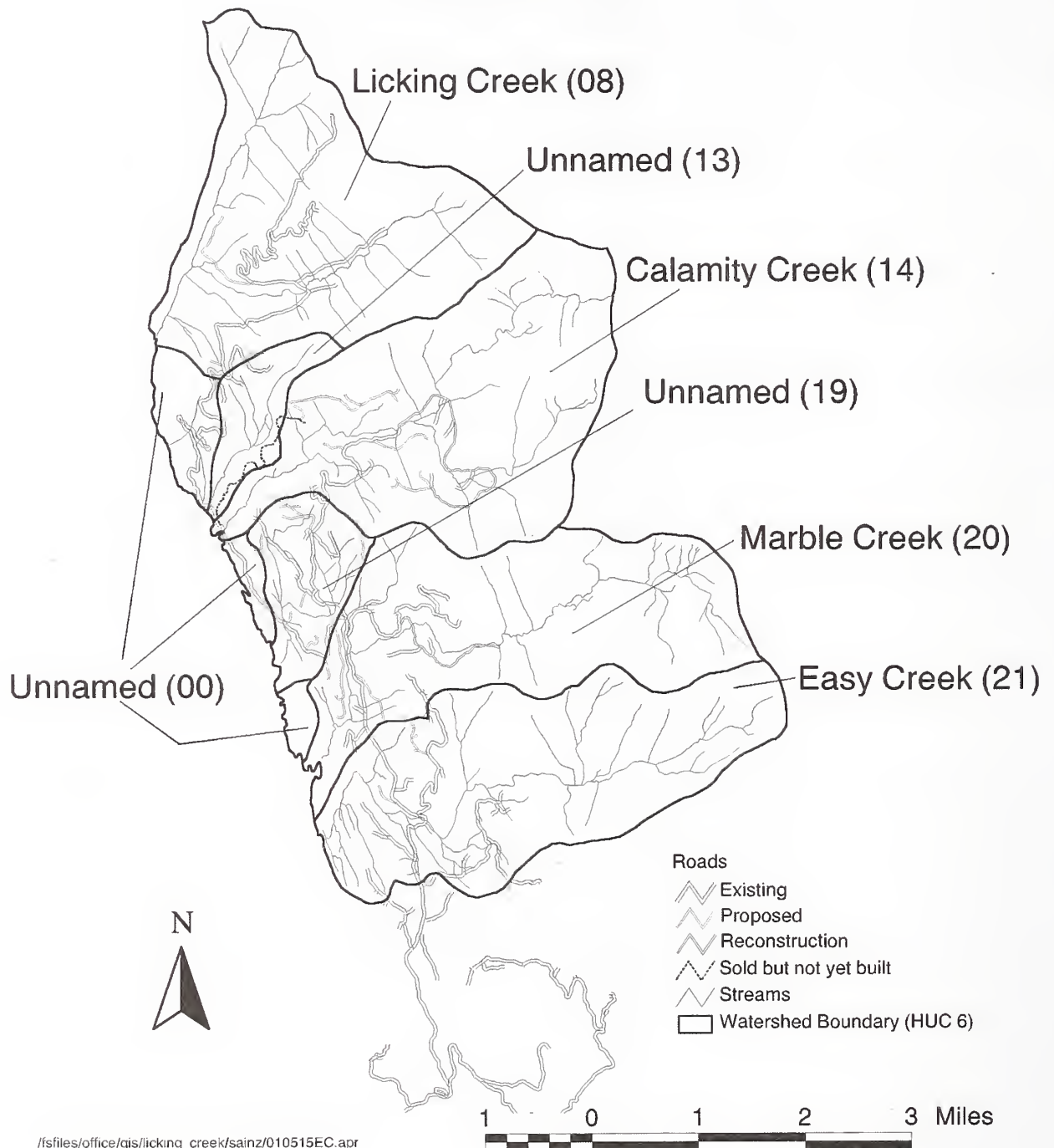
<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.

<sup>2</sup> Designates percent of watershed rated to have high (3) and very high (4) potential for mass movement erosion (slides).

Source: R. Sainz, 2002

Figure 3-3  
Timber Sale Project Area Watersheds, Streams, and Roads

## Licking Creek Timber Sale Watersheds, Existing Condition



Source: R. Sainz, GIS 2002



## Project Area Streams

Existing conditions in streams and fish habitat were determined using information from the following sources:

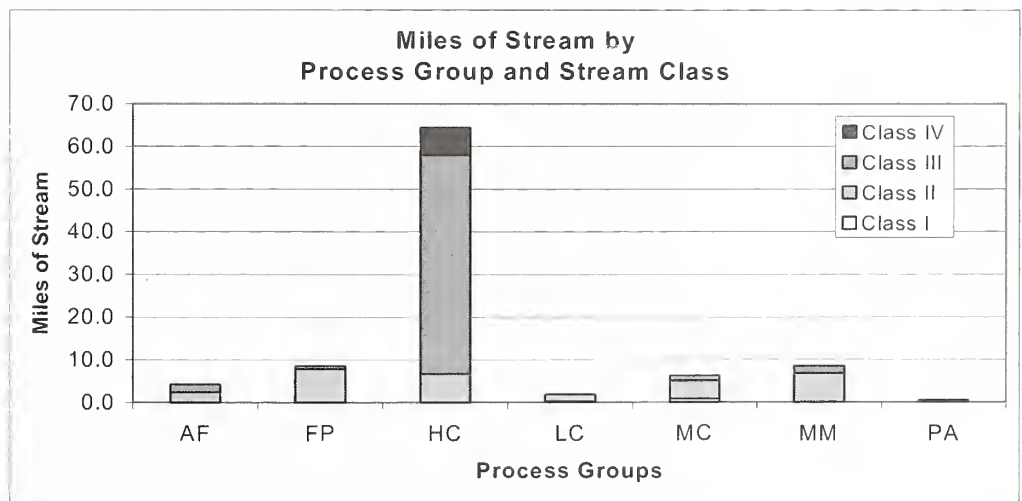
- GIS data layers and analysis,
- ADF&G Anadromous Stream Catalog (1984, 1989),
- Watershed and fisheries information gathered for the Sea Level EIS,
- Forest Service stream inventory, to determine stream channel types and potential fish habitat, and
- Forest Service snorkel surveys, to verify presence or absence of fish.

Stream and fish habitat conditions are summarized below. For more detailed information, see the Watersheds and Fish Habitat resource report, in the project planning record.

The project area contains relatively little high-quality fish habitat, which is generally found in the floodplain (FP) and moderate-gradient mixed-control (MM) stream process groups (Figure 3-4). These are found in all of the project area watersheds, in short reaches, and provide resident fish habitat. Because sediment tends to settle in these channel types, they are sensitive to transport of sediment from upstream.

Because of the steepness of the terrain and morphology of the channels in the project area watersheds, most of the streams are high-energy stream reaches: moderate-gradient contained (MC), low-gradient contained (LC), and high-gradient contained (HC) process groups (Figure 3-4). These tend to transport sediment rather than store it, and so are relatively resilient to upstream effects, but are generally not as productive for fish as the floodplain (FP) and moderate-gradient mixed-control (MM) channel types (which are limited in the project area). However, anadromous fish habitat in the project area occurs in moderate-gradient contained (MC) stream reaches in Licking Creek and Calamity Creek, just above saltwater.

Figure 3-4  
Miles of Stream by Process Group<sup>1</sup> and Stream Class in Licking Creek Project Area



<sup>1</sup>AF = Alluvial Fan, FP = Flood Plain, HC = High-gradient Contained, LC = Low-gradient Contained, MC = Moderate-gradient Contained, MM = Moderate Gradient, Mixed Control, PA = Palustrine. These process groups are described in more detail in Appendix B, Unit and Road Cards, Introduction.

Source: R. Sainz, 2002

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## Fish Habitat

Streams were classified into four types based on fish production values (Table 3-10). Class I streams provide spawning and rearing habitat for anadromous fish species (Pacific salmon). Class II streams support resident fish populations where no anadromous fish occur and otherwise do not meet Class I criteria. Class III streams are perennial streams that do not support fish populations, but have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. Class IV streams are intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability (Glossary, Forest Plan).

Table 3-10  
Length in Miles of Stream by Class I, II, III and IV for each Project Area Watershed<sup>1</sup>

Watershed	Stream Class <sup>2</sup>				Total Miles of Stream
	Class I Anadromous fish habitat	Class II Resident fish habitat	Class III Flow into fish habitat	Class IV No flow into fish habitat	
Unnamed (00)	0.0	0.0	0.0	1.3	1.3
Licking Creek (08)	0.5	6.9	13.4	0.3	21.4
Unnamed (13)	0.0	1.1	2.7	0.0	3.8
Calamity Creek (14)	0.2	3.9	15.2	0.6	19.8
Unnamed (19)	0.0	3.4	1.3	1.9	6.7
Marble Creek (20)	0.0	7.1	9.5	1.2	17.8
Easy Creek (21)	0.2	7.6	14.9	1.1	23.8
<b>Total Miles</b>	<b>0.9</b>	<b>30.0</b>	<b>57.0</b>	<b>6.4</b>	<b>94.6</b>

<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.

<sup>2</sup> Determined from GIS analysis and stream surveys.

Source: R. Sainz, 2002

### Anadromous Fish Habitat

Essential Fish Habitat is stream habitat that is used by anadromous fish (coho, pink, and chum salmon), primarily for spawning and juvenile rearing. This is classified as Class I stream habitat (Table 3-10). Adult salmon spawn in the lower reaches of watersheds, downstream of proposed timber harvest and road construction activities. Juvenile coho rear in freshwater streams, feeding predominantly on aquatic and terrestrial insects. The other fish species and life stages generally do not feed in freshwater.

We conducted stream surveys to identify salmon habitat and snorkel surveys to verify the presence or absence of fish. Chum salmon were observed in the streams, but no coho fry were observed at the time of survey. Nearly all the anadromous habitat in the project area lies within the 1,000-foot beach fringe buffer.

We also used "habitat capability" models to compare Class I habitat quality between the streams. These models assume a relationship between the physical characteristics of a stream channel (channel type) and the potential for fish production. The management indicator species (MIS) selected for our analysis were coho (*Oncorhynchus kisutch*) and pink salmon (*O. gorbuscha*) smolts. Smolts are the life history stage of anadromous fish that return to the open ocean.

Licking Creek contained the greatest length of Class I habitat in the project area, approximately 2,500 feet from salt water to a fish migration barrier. However, the production capability of this habitat was low compared with Easy Creek (Table 3-11), due to its channel type (moderate-gradient contained, MC2). The habitat in Easy Creek was predicted to be the most productive in the project area for pink salmon production, due to the channel type (low-gradient controlled, LC2). Calamity Creek contained about 650 feet of anadromous fish habitat

(moderate controlled, MC1 channel type) below a salmon migration barrier. No anadromous or resident fish were observed in Calamity Creek during snorkel surveys in August 2000.

Table 3-11  
Predicted Salmon Smolt Production

Fish Species	Watershed						
	Unnamed (00)	Licking Creek (08)	Unnamed (13)	Calamity Creek (14)	Unnamed (19)	Marble Creek (20)	Easy Creek (21)
Pink smolts	0	507	0	201	0	0	13,936
Coho smolts	0	169	0	26	0	0	165

Source: GIS, R. Sainz 2002

## Resident Fish Habitat

Most of the watersheds in the project area support some resident fish habitat (Class II streams, Table 3-10). Most Dolly Varden observed during stream surveys were found in Easy Creek, Unnamed 19, and Licking Creek. We conducted snorkel surveys in August 2000 in low-gradient reaches of Calamity Creek and Marble Creek, but found no fish in these watersheds.

**Licking Creek** contains the highest-quality (most productive) resident fish habitat, as compared with the other watersheds in the project area.

High-quality resident fish habitat also occurs in **Unnamed 13** watershed, below an alluvial fan in the center of the watershed.

**Unnamed 19** watershed contains about 3.4 miles of resident fish habitat. In 1996, the District surveyed this stream as part of the Sea Level EIS and identified a 20-foot waterfall near salt water that precludes salmon migration. In 2000, the District replaced the culvert on the 8400-mainline road to allow fish passage.

**Marble Creek** contained resident fish habitat on the eastern portion of the watershed and in the lower reaches. The upper reaches of Marble Creek contained some of the highest-quality resident fish habitat in the project area; however, no fish were observed above Road 8400000 mainline road crossing. A major landslide occurred as a result of past timber harvest and road construction in the north-central portion of the watershed, however, the debris did not encroach upon the mainstem channel.

## Riparian Management Areas

This project would implement the Riparian Standards and Guidelines as set forth in the 1997 Forest Plan. These were specifically developed through a collaborative effort involving lead watershed and fisheries scientists from Federal (management and research) and State (ADF&G, ADEC) agencies. Standards and Guidelines were conservatively established to minimize any impacts to aquatic resources from management activities.

Application of the Riparian Standards and Guidelines requires the identification of Riparian Management Areas (RMAs). All fish-bearing Class I and Class II streams receive a minimum 100-foot no-harvest buffer, with some stream process groups receiving larger buffers. All Class III streams receive a slope break buffer, which means that trees within the slopes of the stream are left standing. Additional windfirm buffers may be applied to ensure that the trees within the sideslopes remain standing. RMA buffers are displayed on the unit card maps in Appendix B.

## Effects of Past Management Actions

Portions of the project area have been previously harvested. The earliest road-accessible harvest occurred around 1954 with subsequent entries almost every 5 years to 1996. (See also the discussion of past harvest in the Silviculture and Timber Management section in this chapter.)



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#### Existing Roads

In 1996, Road Condition Surveys (RCSs) were conducted as part of the Sea Level Timber Sale EIS, which identified several fish stream crossings that prevented fish passage. In 2000, we made corrections to several of these crossings. These included the replacement of 12 culverts with larger culverts, one bridge on a Class II stream, and downstream modifications to Class I stream. This ensured passage on the fish-bearing streams that contained the most fish habitat upstream of roads.

We conducted Road Condition Surveys of existing roads in the project area in 2000 and 2001 to identify additional road reconstruction activities. The Road Cards in Appendix B contain the existing condition information and prescribed mitigation measures for each road, based on the Road Condition Surveys.

Some areas of surface erosion and slumping were identified. The 8446-road in the Licking Creek watershed contains some drainage problems, where water crossing the road could cause problems to fish habitat if not corrected as part of this timber sale. The erosion does not currently affect fish habitat, as the erosional material is deposited into adjacent forested wetland and the riparian area and does not reach the stream. In general, the existing roads do not present problems to water quality.

Stream crossings on roads were also evaluated. One Class I stream crossing is located at the lower reach of Calamity Creek on the 8400-mainline road. This crossing is a bridge that does not prohibit passage of fish. The project area has 29 existing Class II stream crossings, of which 12 may impede fish passage due to gradients that exceed 18 percent or other factors. These crossings were assessed in the field in 2002 to prioritize their replacement; the results are pending. The project area also has 23 existing Class III stream crossings and 21 existing Class IV stream crossings.

Table 3-12  
Past Timber Sale Activities in Project Area Watersheds<sup>1</sup>

Watershed Name	Size (acres)	Existing Roads (miles)	Existing <sup>2</sup> Timber Harvest (acres)
Unnamed (00)	688	3.6	70
Licking Creek (08)	4,107	8.2	588
Unnamed (13)	573	1.2	137
Calamity Creek (14)	4,231	3.2	482
Unnamed (19)	829	4.5	354
Marble Creek (20)	3,721	7.6	1,046
Easy Creek (21)	3,871	9.8	1,201
<b>Total<sup>1</sup></b>	<b>18,020</b>	<b>38.1</b>	<b>3,878</b>

<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.

<sup>2</sup> Timber harvested from 1954 to 1996.

<sup>3</sup> Percent of watershed area.

Source: R. Sainz, 2002

#### Past Riparian Harvest

Riparian forests maintain stream habitat by providing large woody debris and root masses, which dissipate stream energy, maintain habitat structure, and stabilize stream banks. When riparian area trees are removed by timber harvest, it takes approximately 30 years before trees are sufficiently regrown to maintain stable stream banks, and perhaps as long 150 years before large wood is available for recruitment into the channel to dissipate stream energy.

Riparian areas on Class II streams were harvested in the Licking Creek project area as late as 1994 (Table 3-13; Figure 3-5), prior to implementation of the 1997 Forest Plan Riparian Standards and Guidelines. Because the sales were sold prior to the Tongass Timber Reform

Act, stream buffers were rarely greater than one tree length from the edge of the stream. The results of this past harvest, described below, were considered during development of the Licking Creek project, and several units were dropped or their boundaries adjusted to protect riparian and stream habitats. Although all alternatives implement Forest Plan Riparian Standards and Guidelines for habitat protection, Alternative 2 was specifically designed to avoid timber harvest of areas that have a potential to degrade stream habitat or are near heavy riparian harvested areas.

Table 3-13  
Percent of RMA Acres Harvested (1954-1994) by Watershed<sup>1</sup> and Stream Class

	Stream Class I RMA Harvest		Stream Class II RMA Harvest		Stream Class III RMA Harvest	
	Years	%	Years	%	Years	%
Unnamed (00)	N/A	0	N/A	0	N/A	0
Licking Creek (08)	1962	5	1992 1993	5 23	1962-1996	21
Unnamed (13)	N/A	0	1954	0.1	1990	21
Calamity Creek (14)	1961	26	1961-1974	0.5	1989	12
	1962	16	1989	12	1990	4
			1990	0.9	1994	0.8
			1994	0.5		
Unnamed (19)	N/A	0	1974	36	1974	57
Marble Creek (20)	N/A	0	1972	36	1972	0.3
			1974	39	1974	6
			1980	3		
Easy Creek (21)	N/A	0	1972	32	1972	31

<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.  
Source: Estimated from GIS analysis, J. Llanos 2001

Approximately 28 percent of the Class II Riparian Management Areas (RMAs) in the **Licking Creek** watershed experienced harvest in 1992-1993. This included some harvest of floodplain RMA. During recent surveys, we found that the channel depth was shallower and flows were swifter in the harvested area than in the floodplain upstream. Additionally, after construction of Road 8446200 and timber harvest in the watershed, small landslides occurred that crossed the road and entered the floodplain. The District planted spruce trees after this harvest, and survival surveys conducted in 1996 showed good survival rates. The Class I riparian harvest occurred in the beach fringe and was harvested without road construction. This harvest is 40 years old and the vegetation is regrowing.

**Unnamed 13** watershed experienced a small amount of riparian harvest in the headwaters. However, stream surveys in this area and downstream showed no evidence of stream degradation, and the fish habitat appeared adequate to support fish.

Harvest of the Class I RMA in **Calamity Creek** in the early 1960s appears to have had little to no adverse effects on fish habitat, as the channel is naturally deeply incised and hard-bottomed with bedrock. Timber harvest in 1989 removed the riparian buffer on Class II habitat in the center of the watershed. This harvest did not appear to affect the habitat downstream. Some Class III alluvial fan habitat in the southeastern portion of the watershed was also harvested in 1989. Stream surveys in 2000 identified bank erosion where Road 8444000 crosses Calamity Creek for the first time. This erosion is confined to the vicinity of the crossing and from two sources: all-terrain vehicles crossing the creek, and road material left near the creek when the bridge was removed.

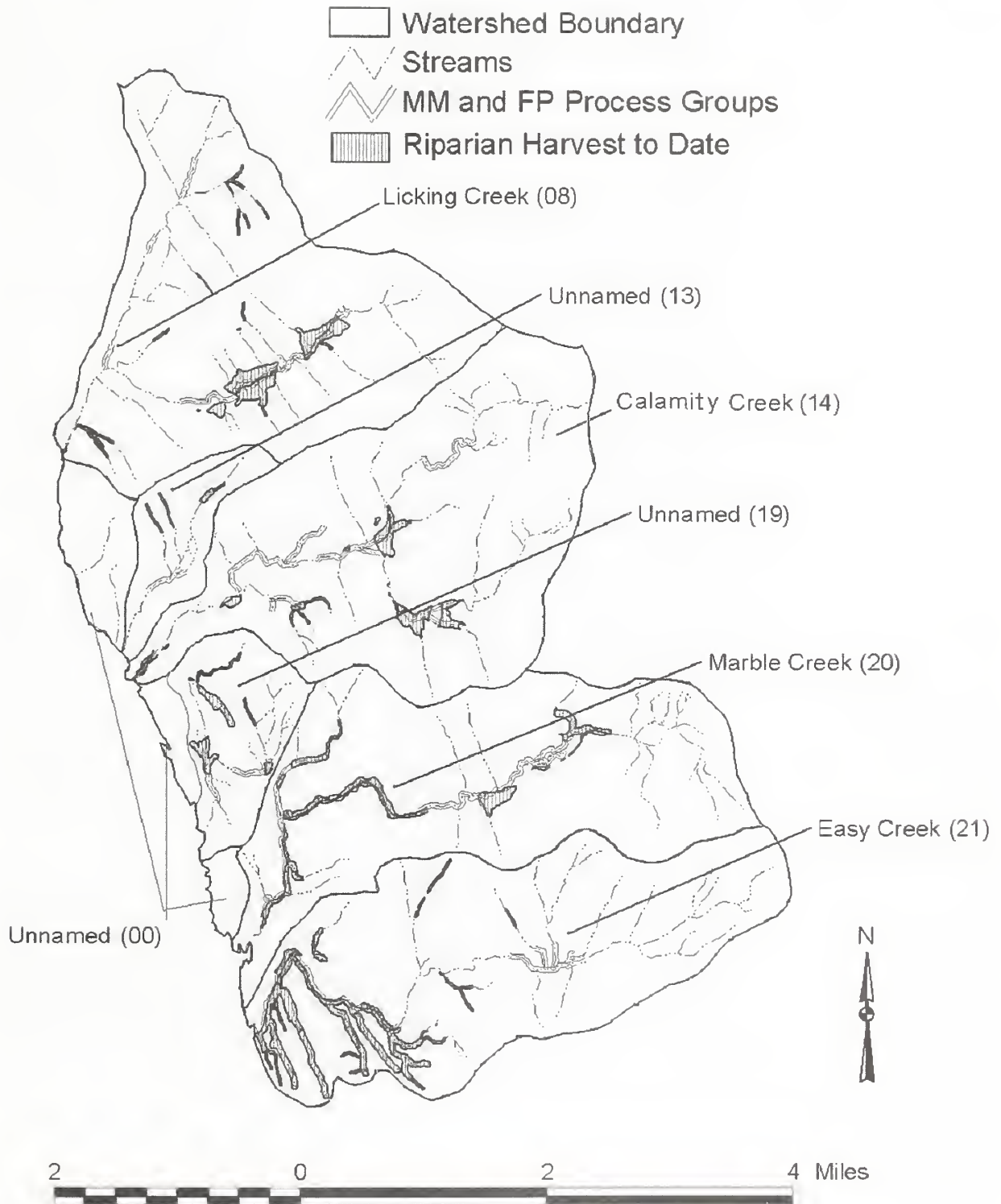
### 3 Environment and Effects

Harvest of the Class II RMA in **Unnamed 19** watershed took place on high-gradient contained (HC2 and HC3) channels, which are marginal as fish habitat. Additionally, Class II riparian habitat was disturbed by the construction of Road 8400000. In recent surveys, we observed heavy alder thickets growing below the stream crossing, and the channel was showing widening and deposition of material.

**Marble Creek** experienced substantial riparian timber harvest along Class II portions of the stream system. Approximately 7,800 feet of harvested stream channel, above Road 8400000, showed decreased habitat complexity and loss of large woody debris. However, riparian harvest in the upper watershed contained complex habitat and appeared unaffected. Increased sedimentation was observed in Marble Creek below Road 8400000. This sediment appeared to be from small V-notch tributaries in the lower watershed. Some landsliding was observed, but the mainstem channel downslope of the slide was hard-bottomed and showed little deposition of material.

Thirty-two percent of the Class II RMA was harvested in **Easy Creek** in 1972. This harvest occurred both above and below Road 8400000. Tall alders dominated the canopy and the channel appeared significantly widened, as evidenced by shallow stream banks. Most of the substrate consisted of large cobble and boulder, which was larger material than that found in most of the watershed streams. Below the riparian harvest, the channel was contained and bedrock controlled, and fish were observed. Within this watershed, but outside of the project area, the Road 8400441 washed out above the intersection with Road 8400440; this erosion may have affected downstream fish habitat.

Figure 3-5  
Existing Timber Harvest in Riparian Management Areas



Source: R. Sainz, 2002



## Direct and Indirect Effects of Timber Harvest

### Environmental Consequences

Potential impacts that may result from timber harvest are elevated stream temperatures, surface erosion in timber harvest units, and elevated runoff and sediment resulting from removal of upland vegetation. Long-term studies that can quantitatively describe the direct or cumulative impacts of timber harvest activities on these factors do not yet exist for ecosystems in the Tongass National Forest. To address these concerns, which arose during the last Forest Plan revision, Congress assigned a panel of fisheries and hydrology experts to assess the potential impacts that land management activities might have on fish habitat in Alaska. The panel presented their findings to Congress in January 1995, in a document titled Anadromous Fish Habitat Assessment (AFHA). These findings were directly incorporated into Fish Standards and Guidelines in the 1997 Forest Plan. When Forest Plan Standards and Guidelines are applied, fish habitat degradation is expected to be negligible (Forest Plan ROD).

According to direction issued in the Forest Plan, Appendix J, a Watershed Analysis is not required if a timber sale will fully implement the Forest Plan Standards and Guidelines. The Licking Creek project does not require a watershed analysis because we will fully implement Standards and Guidelines on all stream courses in the project area.

#### Best Management Practices (BMPs)

Best Management Practices may be defined as land management methods, measures or practices intended to minimize or reduce water pollution including, but not limited to, structural and nonstructural controls, operation and maintenance procedures, other requirements and scheduling and distribution of activities. The site-specific application of BMPs is designed with the consideration of geology, land type, hydrology, soil type, erosion hazard, climate, cumulative effects, and other factors in order to fully protect and maintain soil, water, and water-related beneficial uses, and to prevent or reduce nonpoint source pollution.

The Forest Implementation Monitoring and Evaluation Group (IMEG) monitors appropriate BMP application, whether they were correctly implemented, and if not, whether corrective actions were taken. In 2000, the evaluation of results shows that the Tongass has successfully implemented the BMPs (Appendix B, Table 1, page 11, Tongass Monitoring and Evaluation 2000 Report).

In 1999, the Tongass National Forest developed and implemented monitoring to determine whether Fish and Riparian Standards and Guidelines are effective in maintaining or improving fish habitat. We are beginning to monitor trends in populations of Dolly Varden and cutthroat in streams subject to forest management under the current standards and guidelines. These studies are long-term and the results will not be available for several years.

#### Runoff and Sediment

We believe the risk of stream bank erosion or introducing excessive sediment to fish habitat from this timber sale is minimal, as all proposed harvest units are upstream and away from fish streams, and riparian buffers would be applied as prescribed in the Riparian Standards and Guidelines. However, some changes in flow regime may occur due to removal of vegetation (by timber harvest) and reduced evapotranspiration. Acres of proposed harvest by watershed and alternative are presented in Table 3-14. These unit acres include areas that wouldn't be harvested, such as riparian buffers, deferrals for marten habitat and soils concerns, etc.

Table 3-14  
Proposed Harvest Unit Acres<sup>1</sup> Listed by Watershed and Alternative

Watershed	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Unnamed (00)	0	0	41	30
Licking Creek (08)	85	191	193	253
Unnamed (13)	1	1	12	12
Calamity Creek (14)	89	213	175	183
Unnamed (19)	1	34	147	61
Marble Creek (20)	47	54	123	130
Easy Creek (21)	30	80	99	96
<b>Total Acres</b>	<b>253</b>	<b>573</b>	<b>790</b>	<b>765</b>

<sup>1</sup> Unit acres include areas not proposed for harvest, such as riparian buffers, deferrals for marten habitat and soils concerns.

Source: R. Sainz, GIS, 2002

### Stream Temperature

Mandatory no-cut buffers established on all Class I – III streams for all alternatives would significantly reduce the likelihood of temperature-related effects to streams within the Licking Creek project area. Proposed timber harvest units would have a 100-foot (minimum) no-cut buffer between the unit and Class I and II streams. Class III streams would receive a no-cut buffer from the edge of the channel to the first slope break. Class IV streams do not receive mandatory no-cut buffers under the Forest Plan. No significant effects are expected on water temperature under any of the action alternatives.

Water temperature monitoring conducted in Traitors River and Klam Creek, as part of North Revillagigedo Timber Sale EIS, indicated that temperature increases do not directly correlate to timber harvest activity in those watersheds. The temperatures at those locations prior to and after timber harvest do not show any significant differences in temperature and rarely exceed 59°F (15°C) except in mid July to late July.

### Large Woody Debris

Mandatory no-cut buffers established along all Class I – III streams on all action alternatives decrease the likelihood of a reduction in the short or long-term recruitment of large wood to streams. There is no anticipated reduction of large wood recruitment in the Licking Creek project area as a result of the proposed harvest. Although the stream surveys did not quantify the amount of wood, part of the survey objective was to identify areas for placement of large woody debris and none were identified. The channels that did not contain large woody debris were bedrock-controlled; large woody debris does not influence stream morphology in these channel types.

## Direct and Indirect Effects of Roads

We anticipate minimal impacts to fish habitat from the proposed road construction, reconstruction, and related activities. These activities would follow all appropriate Best Management Practices (BMPs) as outlined in the Forest Service Handbook (FSH 2509.22). Potential impacts from road activities include sediment delivery from road surfaces and culvert replacements, and fish passage barriers at stream crossings. Miles of proposed road construction by alternative are shown in Table 3-15.

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Table 3-15  
Miles of Proposed Road Construction by Watershed and Alternative

Watershed	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Unnamed (00)	0.0	0.0	0.2	0
Licking Creek (08)	0.3	0.4	0.6	0
Unnamed (13)	0.1	0.1	0.0	0
Calamity Creek (14)	0.6	1.0	1.0	0
Unnamed (19)	0.0	0.0	1.8	0
Marble Creek (20)	0.2	0.2	0.9	0
Easy Creek (21)	0.3	0.4	1.0	0
<b>Total Miles<sup>1</sup></b>	<b>1.5</b>	<b>2.1</b>	<b>5.5</b>	<b>0</b>

<sup>1</sup> Total miles may not exactly match totals shown elsewhere, due to rounding.

Source: J. Llanos, 2002

#### Road Erosion

Roads would be designed with adequate road drainage features, according to BMPs, to prevent surface erosion of the road prism or sediment delivery directly into streams. Roads would be maintained during their use to protect the running surface and keep drainage features functional. Upon conclusion of timber harvest and associated silvicultural activities, all new roads would be closed and stormproofed (physical barriers installed and drainage pipes removed). (See additional discussion under Transportation in Chapter 3 and in the road cards, Appendix B).

Tongass water quality effectiveness monitoring in 2000 included turbidity measurements for culvert placement. These were done at Shelter Cove and Shoal Cove, usually less than 3 hours following road construction (TNF Annual Monitoring & Evaluation Report for Fiscal Year 2000, pg. 2-100). Water quality criteria for turbidity were met at all of the sites on the Ketchikan-Misty Fiords Ranger District. This indicated that BMPs to prevent water quality degradation from erosion associated with new road construction were effective.

#### Fish Passage

Currently, National Forest System road construction and maintenance is debated nationally. (Forest Service Roadless Area Conservation Draft EIS Summary and Proposed Rule). On the Tongass, past road construction practices have impaired fish passage. The Tongass Land Management Plan 2001 Monitoring Report found that approximately 34 percent of existing Class I, and 71 percent of existing Class II fish habitat crossings do not meet current fish passage standards, although in many cases fish are passing through under some conditions. In recent years, the Tongass National Forest has begun a field survey effort to characterize all road crossings and identify passage deficiencies (Annual Monitoring & Evaluation Report for Fiscal Year 2001). New fish passage construction methods are expected to successfully provide fish passage at new culvert installations.

Under all alternatives, during road reconstruction to access harvest units, we would replace three existing crossings (two bridges and one culvert) on Class II streams. Construction or reconstruction of roads would include restoration of fish passage at additional crossings where judged necessary, based on field surveys conducted in 2002; these results are pending.

No new crossings of fish habitat (Class I or Class II stream) are proposed under any of the alternatives. One new Class III stream crossing is proposed for Alternative 3. Two new Class III stream crossings and two new Class IV stream crossings are proposed for Alternative 4.



## Mitigation - Instream Timing Restrictions

In-stream construction is restricted on Class I streams to a specific time of the year to protect critical freshwater life phases of Pacific salmon. A Class I designation is given to streams and lakes that contain "anadromous or adfluvial fish habitat." (Adfluvial habitat is a tributary stream that provides spawning and juvenile rearing habitat for salmonids that grow to maturity in a lake and then return to spawn in the tributary.) Road construction and reconstruction includes some timing restrictions to Class I streams that support known populations of Pacific salmon. Timing restrictions may also apply to Class II and III streams, when in-stream road construction is likely to have an immediate impact on Class I habitat downstream of the road construction activity. Timing windows, when in-stream construction is permitted, coincide with absence of spawning adult salmon, salmon eggs, or larval salmon in the gravel (Table 3-16). The road cards specify where timing restrictions apply to all existing and proposed roads in the project area.

These timing restrictions limit activities when salmon are expected to be in the stream. Timing windows can be altered, should stream-specific information be identified for the project area that shows salmon are present during time periods different than those described in the generic timing windows.

**Table 3-16**  
Timing Windows for In-stream Road Construction

Species	Timing Window
Pink / Chum	June 1 to August 3
Coho	June 15 to September 1

Source: FSH 2090.21 Aquatic Habitat Management Handbook, 2002

## Effects by Alternative

### Alternative 1

No new harvest or road building would occur in this alternative. Any new impacts to fish habitat or water quality would be caused by naturally occurring disturbances. The No-action Alternative is presented as a baseline of comparison for the action alternatives.

### Items Common to All Action Alternatives

Potential effects on downstream water quality were identified as an issue, due to the level of previous timber harvest (and riparian harvest) in the project area. However, because most of the stream channels in the project area are bedrock-controlled and resistant to erosion, risks of sediment transport are inherently low. Forest Plan Standards and Guidelines, and Best Management Practices for road placement and construction, (reconstruction only in Alternative 5), were applied to all action alternatives; these are designed to minimize sediment transport from upland areas. During alternative development, several units were dropped for watershed and other concerns, which further reduced the overall level of risk.

Anadromous fish (salmon) habitat within the Licking Creek project area is minimal, and the project area watersheds are, generally, unproductive for these species. With the application of Forest Plan Standards and Guidelines, including those for riparian areas, risks to freshwater or marine resources would be minimized. None of the action alternatives are anticipated to adversely affect Essential Fish Habitat. Recreational fishing access would be unaffected, as all new roads would be closed after timber harvest and associated silvicultural activities. Three existing crossings on Class II streams would be reconstructed (two bridges and one culvert), under all four action alternatives, and designed to allow fish passage.

Classified roads built in Alternatives 2, 3 and 4 would remain open and be maintained at Maintenance Level 2 until silvicultural activities are completed. (No new roads would be built under Alternative 5.) At that time, new roads would be closed, culverts would be removed, and the roads would be placed into storage in as maintenance-free a condition as possible.

Temporary roads would also be closed after the timber sale is completed, including removal of



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culverts and restoring the channel profile at the stream crossing so that the banks slope at a minimum of 1.5 to 1 ratio. (See additional discussion under Transportation, Chapter 3, and the road cards, Appendix B.)

## Alternative 2

Alternative 2 was designed to address concerns for cumulative effects of timber harvest on fish and water resources. (The project planning record contains a list of units that were dropped during alternative development and the reasons for their deletion.) This alternative proposes the least timber harvest and new road construction, and no new stream crossings. It would avoid harvest in Unnamed 19 watershed, which has the highest percentage of cumulative harvest.

## Alternative 3

Alternative 3 ranks intermediate among the action alternatives in the potential to adversely affect fish and water resources. This alternative proposes more timber harvest and new road construction than Alternative 2, and one new Class III stream crossing, in Calamity Creek watershed to access Unit 31. This crossing would not require timing restrictions, as the anadromous habitat is over 2 miles downstream from this crossing. As in Alternative 2, this alternative would avoid harvest in Unnamed 19 watershed. Additional harvest was proposed in all other watersheds except Marble Creek.

## Alternative 4

Of the action alternatives, Alternative 4 would have the greatest potential effect on fish and water resources. This alternative proposes the most timber harvest and new road construction, and two new Class III stream crossings - one in Calamity Creek watershed to access Unit 31, and one in Unnamed 19 watershed. Under this alternative, timber harvest was increased (over that proposed in Alternative 3) in all watersheds except Calamity Creek. Harvest of Unit 43 in Unnamed 19 watershed is proposed. It also proposes two new Class IV stream crossings in the Marble Creek watershed to access Unit 67.

## Alternative 5

Of the action alternatives, Alternative 5 would have the second greatest potential effect on fish and water resources, after Alternative 4. Although this alternative would harvest nearly as much timber as Alternative 4, it would employ more helicopter logging, which produces much less ground disturbance than conventional cable logging. This alternative would avoid harvest in Unnamed 19 watershed, and does not propose any new road construction or new stream crossings.

## Cumulative Effects

### Other Scheduled Timber Harvest

The Madder Timber Sale was analyzed in the Sea Level EIS and has since been sold. The decision for the Mop Point/91 Knot EA was signed in 2002. The road miles and timber harvest for the cumulative effects of the existing conditions, the Madder timber sale and the Mop Point/91 Knot timber sale actions are shown in Table 3-18 and Table 3-19.

One adjustment was made in the Madder Timber Sale roads design. About 0.8 mile of new road is scheduled to be built in Unnamed 13 watershed. This road, as planned in the Sea Level Final EIS, crossed a Class II stream four times. During layout, the road location was adjusted to avoid crossing any fish-bearing streams.

Table 3-17

Timber Harvest and Road Construction-Madder and Mop Point/91 Knot Timber Sales Actions in the Licking Creek Project Area Watersheds<sup>1</sup>

Watershed Name	Size (acres)	Madder TS Planned <sup>1</sup> Roads (miles)	Mop Point/91 Knot Planned <sup>1</sup> Roads (miles)	Madder TS Planned <sup>2</sup> Timber Harvest (acres)	Mop Point/91 Knot Planned <sup>2</sup> Timber Harvest (acres)
Unnamed (00)	688	0.1	0.1	32	9
Licking Creek (08)	4,107	0	0	0	0
Unnamed (13)	573	1.5	0	59	0
Calamity Creek (14)	4,231	1.2	0	45	0
Unnamed (19)	829	0.8	0	73	0
Marble Creek (20)	3,721	0.5	0	40	0
Easy Creek (21)	3,871	0.5	0	0	0
<b>Total<sup>1</sup></b>	<b>18,020</b>	<b>4.6</b>	<b>0.1</b>	<b>249</b>	<b>9</b>

<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.

<sup>2</sup> Madder and Mop Pt./91 Knot Timber Sale actions are scheduled to be completed by 2006. Acres by watershed are approximate.

Source: R. Sainz, 2002

### Cumulative Effects of Timber Harvest and Road Construction

A method to establish quantitative thresholds for cumulative effects has not yet been developed for watersheds on the Tongass National Forest. Accurate analysis of cumulative effects requires long-term study of interactive landscape processes; the kind of quantitative knowledge and published literature that results from a long-term study is not currently available at the project scale for the Alaska Region. Without a literature-based method for describing the natural range of hydrologic and geomorphic variability in the watersheds of the Licking Creek project area, this analysis relies upon the guidance provided by the Forest Plan in the form of management Standards and Guidelines to minimize management-related cumulative effects.

The following tables illustrate the combined effects of existing harvest, the scheduled Madder and Mop Point/91 Knot Timber Sales, and the Licking Creek actions by alternative. These are effects within the entire watersheds (which include areas outside of the project area).

Table 3-18

Cumulative Timber Harvest in Watersheds<sup>1</sup> by Alternative

Watershed Name	Size (acres)	Cumulative Timber Harvest (acres)				
		Alt. 1 <sup>2</sup> (No Action)	Alt. 2 <sup>3</sup>	Alt. 3 <sup>3</sup>	Alt. 4 <sup>3</sup>	Alt. 5 <sup>3</sup>
Unnamed (00)	688	111	111	111	152	141
Licking Creek (08)	4,107	588	673	779	781	841
Unnamed (13)	573	196	197	197	208	208
Calamity Creek (14)	4,231	527	616	740	702	710
Unnamed (19)	829	427	428	461	574	488
Marble Creek (20)	3,721	1,086	1,133	1,140	1,209	1,216
Easy Creek (21)	3,871	1,201	1,231	1,281	1,300	1,297
<b>Total</b>	<b>18,020</b>	<b>4,136</b>	<b>4,389</b>	<b>4,709</b>	<b>4,926</b>	<b>4,901</b>

<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.

<sup>2</sup> Timber harvest from 1954 to 1996 and timber harvest scheduled under Madder and Mop Point/91 Knot timber sales.

<sup>3</sup> Total of existing, Madder and Mop Point/91 Knot units and harvest units proposed under each alternative.

Source: R. Sainz, 2002

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Table 3-19  
Cumulative Road Miles in Watersheds<sup>1</sup> by Alternative

Watershed Name	Size (acres)	Cumulative Road Miles				
		Alt. 1 <sup>2</sup> (No Action)	Alt. 2 <sup>3</sup>	Alt. 3 <sup>3</sup>	Alt. 4 <sup>3</sup>	Alt. 5 <sup>3</sup>
Unnamed (00)	688	3.8	3.8	3.8	4.0	3.8
Licking Creek (08)	4,107	8.2	8.5	8.6	8.8	8.2
Unnamed (13)	573	2.7	2.8	2.8	2.7	2.7
Calamity Creek (14)	4,231	4.4	7.7	8.1	5.7	7.1
Unnamed (19)	829	5.3	5.3	5.3	7.1	5.3
Marble Creek (20)	3,721	8.1	9.7	9.7	10.4	9.5
Easy Creek (21)	3,871	10.3	10.6	10.7	11.3	10.3
<b>Total</b>	<b>18,020</b>	<b>42.8</b>	<b>48.4</b>	<b>49.0</b>	<b>50.0</b>	<b>46.9</b>

<sup>1</sup> Watersheds include areas outside of the project area; consequently, totals will be larger than those for the project area.

<sup>2</sup> Existing roads and road construction scheduled under Madder and Mop Point/91 Knot timber sales.

<sup>3</sup> Total of existing roads, Madder and Mop Point/91 Knot roads, road construction and road reconstruction proposed under each alternative.

Source: R. Sainz, 2002

#### Alternative 1 (No Action)

The existing conditions in the project area for stream channel conditions, fish habitat, and riparian management areas would continue. Timber harvest and road construction for the Madder and Mop Point/91 Knot timber sales will occur as scheduled. This will increase recent timber harvest and road miles in the project area watersheds (Tables 3-18 and 3-19).

Application of Forest Plan Standards and Guidelines, including no-cut riparian buffers, and Best Management Practices for road construction, would protect fish habitats. Riparian areas previously harvested would continue to regrow, and over time would be restored to pre-harvest levels.

#### Alternatives 2, 3, 4, and 5

Timber harvest and road construction for the Madder and Mop Point/91 Knot timber sales will occur as scheduled. Combined with the Licking Creek alternatives, this would increase the total timber harvest and road miles in the project area watersheds (Tables 3-18 and 3-19). The cumulative effects of each alternative on fish habitat and water quality would be similar to those described above. Application of Forest Plan Standards and Guidelines, including no-cut riparian buffers, and Best Management Practices for road construction, would protect fish habitats. Riparian areas previously harvested would continue to regrow, and over time would be restored to pre-harvest levels.

#### Essential Fish Habitat Assessment

An agreement between the National Marine Fisheries Service and the Forest Service, dated August 25, 2000, described what factors are to be considered in an assessment of potential effects on Essential Fish Habitat. These include 1) a description of the proposed action (see Chapter 2, Alternatives Considered in Detail); 2) an analysis of individual and cumulative effects of the action on Essential Fish Habitat, the managed species, and associated species such as major prey species, including affected life histories; 3) the Forest Service's assessment regarding effects on Essential Fish Habitat; and 4) a discussion of proposed mitigation, if applicable.

Potential effects of the project on Essential Fish Habitat may be degraded water quality and altered physical stream habitat. Degraded water quality may include increased water temperature or suspended sediment. Potential changes in physical habitat may include reduced pool volume, due to filling from sedimentation and changes in composition of the substrate. Pool volume is important to rearing and over-wintering of juvenile coho. Increased fines in the substrate can reduce survival of salmon eggs and change the assemblages of aquatic insects used by fish for food.

The Forest Service has determined that this project *May Affect* Essential Fish Habitat, and plans to continue the consultation process with the National Marine Fisheries Service. However, we anticipate no detectable effects on fish habitat due to implementation of the timber sale. We would implement the Standards and Guidelines for protection of fish habitat from the Forest Plan and the applicable Best Management Practices. The Standards and Guidelines and the BMPs have been developed through interagency negotiation and are believed to provide “state-of-the art” protection of fish habitat.

We believe the risk to Essential Fish Habitat is minimal with this timber sale, as all proposed harvest units are upstream and away from salmon streams. All structures (bridges, stringer bridges, culverts) crossing Class I fish habitat in the Licking Creek Timber Sale project are already in place, and currently provide passage for juvenile and adult salmon in accordance with the agreed-upon passage standards (Forest Plan Final EIS). No additional mitigation measures (beyond Standards and Guidelines) were recommended.



## Issue 4: Transportation

**Issue Statement: An open road system should be managed to meet our current and future capability for road maintenance. Economics of building new roads must be considered.**

The Forest Service Transportation Policy (FSM 7700) establishes requirements for roads analysis when planning to construct, reconstruct or close roads on National Forest System lands. The Tongass National Forest has prepared this environmental impact statement to be consistent with the Forest Service Transportation Policy. The Licking Creek project Roads Analysis is located in the project planning record.

Transportation systems in the project vicinity can be broken into two categories: Forest Service roads, and log transfer facilities (LTFs). Three other transportation categories, 1) State and municipal roads (2) private roads and (3) public transportation facilities such as State highways, ferry docks, or airports, do not occur in the vicinity of the Licking Creek project area. Roads are described below; log transfer facilities are discussed in the Log Transfer Facilities and Related Sites section.

### Affected Environment

National Forest System roads are designed to varying standards depending on use. Arterial and collector roads are mainline roads designed and maintained for prolonged use by passenger vehicles. They generally require higher construction standards and heavier financial investment, but can be built to lower standards initially and upgraded as use intensifies. Local roads are generally single-purpose roads, not designed or maintained to accommodate passenger vehicles. They are usually built to lower design standards and cost less than arterial and collector roads.

National Forest System roads are classified, based on current or anticipated use, into one of three maintenance levels. Maintenance levels incorporate traffic service levels, as indicated in the following definitions.

- Maintenance Level 1 - Roads are closed by barrier, bridge removal or organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities. As used in this EIS, road "closure" includes the removal of drainage pipes and stormproofing ditches and drainage features, so that ongoing maintenance is not needed. This work would be done after the harvest units were recertified as regenerated, usually within 3 years after completion of the timber harvest. Some road segments may be closed immediately after timber harvest is concluded. (See also the road cards, Appendix B).
- Maintenance Level 2 - Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic is normally minor, usually consisting of administrative or recreational uses.
- Maintenance Level 3 - Roads are maintained for travel by a prudent driver in a standard passenger vehicle and are subject to the provisions of the Highway Safety Act. Road use is by administrative and passenger vehicles, and by logging trucks.

None of the existing National Forest System roads within the Licking Creek project area connect to other existing road systems on Revillagigedo Island, and except for Maintenance Level 3, roads are not maintained for passenger vehicles. Approximately 5.9 miles are Maintenance Level 3 (the road to the Coast Guard station); the remaining miles are Maintenance Level 2. These single-lane, rough-rock roads are primarily designed for heavy, off-highway logging trucks to implement silvicultural activities on the National Forest. Approximately 4.1 miles of additional road will be constructed for the Maddier Timber Sale, by 2006. Roads constructed under this timber sale are Maintenance Level 1. There are no State or municipal roads, private roads, or public transportation facility roads within the project area.

## Environmental Consequences

The effects of the transportation system on other resources are considered in the specific resource sections (Fisheries, Subsistence, Wildlife, Recreation, and Scenery). In this section, we focus on the effects of each alternative on the transportation system, and discuss post-project access management.

All new roads proposed for each alternative would be constructed as Maintenance Level 1. Maintenance Level 1 roads are closed by barrier, bridge removal or by organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities. Roads are built to Forest Service Specifications and BMPs (Table 3-20; see also the maps for Alternatives 2 through 4, Chapter 2). Road development patterns are similar from one alternative to another due to the location of the resource being used, terrain characteristics, and development costs. Variations in road segments occur due to differences in routes and location of log transfer facilities. Roads are located to minimize disturbance on the land, yet provide access to resources. Thus, road locations generally follow routes of favorable terrain where practical.

Classified roads are part of the permanent road system, and built to a higher road construction standard than temporary roads. Temporary roads (usually short spurs) are built for harvest entry and are closed when the sale is completed.

**Table 3-20**  
**Proposed Road Construction Lengths and Costs**

	<b>Alt. 2</b>	<b>Alt. 3</b>	<b>Alt. 4</b>	<b>Alt. 5</b>
<u><b>Classified Road</b></u>				
Miles	0.67	1.06	3.13	0
Cost	\$169,100	\$249,600	\$594,700	0
<u><b>Temporary Road</b></u>				
Miles	0.83	1.11	2.36	0
Cost	\$58,000	\$84,550	\$224,200	0
<b>Total Miles of New Construction</b>	<b>1.50</b>	<b>2.17</b>	<b>5.49</b>	<b>0</b>
<u><b>Reconstructed Road</b></u>				
Miles	4.11	4.11	1.65	4.11
Cost	\$156,000	\$156,000	\$90,000	\$156,000
<u><b>Pre-Haul Maintenance</b></u>				
Miles	21.43	23.06	21.10	23.06
Cost <sup>1</sup>	\$170,000	\$170,000	\$170,000	\$170,000
<b>Total Cost</b>	<b>\$553,100</b>	<b>\$660,150</b>	<b>\$1,078,900</b>	<b>\$326,000</b>

<sup>1</sup> Cost is estimated and not differentiated between alternatives at this time.  
Source: B. Emley, D. Fletcher 2002

## Transportation System Costs

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A designed road system reflects a balancing of various economic and resource considerations. The available timber volume must be of adequate stumpage value to cover the costs of road construction and maintenance. Conversely, roads can shorten the yarding distances for cable and shovel logging systems, thus reducing some costs and some resource impacts of the sale. Classified roads also provide access for future sale management opportunities.

## Access Management

After the completion of harvest activities, road access is managed to prevent damage to the roadway and to meet other resource objectives, while maintaining access for public uses and timber management-related activities. The Ketchikan-Misty Fjords Ranger District's access management program will include public and agency involvement, and interagency evaluation of road management objectives.

The following points were used to develop access management strategies for the Licking Creek project area:

- Meet Forest Plan Standards and Guidelines, while addressing the economic and social needs of the communities and residents associated with the project, and meeting administrative needs.
- In general, "eliminate" rather than "prohibit" road use (as defined below). Formal CFR road closures prohibiting use are not currently planned for any roads, but could be required in the future if use is detected.

The following access management categories were used in the action alternatives.

- Encourage - Motor vehicle use is encouraged by appropriate signing, public notification, and active maintenance of the road prism.
- Eliminate - Motor vehicle use is eliminated by physically blocking the road. Where prescribed for long-term intermittent roads, this strategy is achieved by placement of impassable barricades at road entrances. On short-term roads, removal of drainage structures effectively blocks vehicle traffic.
- Prohibit - Motor vehicle use is prohibited by a road order (CFR closure). Implementation of this strategy on remote road systems may require the installation of gates, in addition to public notification and appropriate signing.
- Prohibit Seasonally - Road is closed to motor vehicle use at times during the normal operating year. For all alternatives, seasonal prohibitions will be used as necessary to mitigate impacts to wildlife and subsistence resources (e.g., closure during either sex deer hunting season). Administrative and permitted use of the roads will continue during closure periods, but only for specific permitted uses. Seasonal closures may be used in combination with cooperative efforts with fish and game protection agencies.

Access management strategies for specific roads in the project area vary with each alternative (Table 3-21). These are described in detail in the road cards (Appendix B) under Road Management Objectives.

**Table 3-21**  
**Proposed Access Management for Roads to Implement the Licking Creek Project**

Road Number	Road Miles	Alt. 1 (Current Status)	Alt. 2	Alt. 3	Alt. 4	Alt. 5
8400000 (E)	7.84	Encourage	Encourage	Encourage	Encourage	Encourage
8400420 (E)	1.41	Encourage	Encourage	Encourage	Encourage	Encourage
8400450 (E)	1.46	Prohibit Seasonally	N/A	Prohibit Seasonally	Prohibit Seasonally	Prohibit Seasonally
8442000	0.88 (E)	Encourage	Eliminate	Eliminate	Eliminate	Eliminate
	1.37 (R)	Currently Eliminated	Eliminate	Eliminate	Eliminate	Eliminate
8444000	3.14 (E)	Encourage	Eliminate	Eliminate	Eliminate	Eliminate
	2.74 (R) (Alts 2,3,5)	Currently Eliminated	Eliminate	Eliminate		Eliminate
	0.29 (R) (Alt 4)				Eliminate	
8444050 (E)	0.81	Currently Eliminated	N/A	N/A	Eliminate	N/A
8446000 (E)	7.77 (Alts 2,3,5)	Encourage	Encourage	Encourage		Encourage
	5.50 (Alt 4)				Encourage	
8446100 (E)	0.55	Encourage	Prohibit seasonally	Prohibit Seasonally	N/A	Prohibit Seasonally
8400470 (N)	0.58	N/A	N/A	N/A	Eliminate	N/A
8400451 (N)	0.24	N/A	N/A	N/A	Eliminate	N/A
8444051 (N)	0.37	N/A	N/A	N/A	Eliminate	N/A
8444060 (N)	0.68	N/A	N/A	N/A	Eliminate	N/A
8444200 (N)	0.22 (Alt 2)	N/A	Eliminate			N/A
	0.61 (Alts 3,4)			Eliminate	Eliminate	
8444300 (N)	0.18	N/A	Eliminate	Eliminate	N/A	N/A
8446150 (N)	0.42	N/A	N/A	N/A	Eliminate	N/A
8400445 (N)	0.27	N/A	Eliminate	Eliminate	Eliminate	N/A

N/A Not applicable to this Alternative  
 (N) New Construction on this Alternative  
 (R) Reconstruction on this Alternative  
 (E) Road Requiring Pre-haul Maintenance on this Alternative  
 Source: R. Emley, 2002

The amount of road system necessary to implement sound multiple-use management of National Forest System lands is based on the Forest Plan and identified community needs. The activities proposed for road construction and maintenance in this project respond to Forest Plan goals and objectives to protect water, soil, fish, and other resources. The amount of road construction (Table 3-21), when combined with other proposed roads Forest-wide, is well within the Forest Plan objectives. All new road location and design would meet or exceed the Forest Plan Standards and Guidelines (Forest Plan, page 4-104 to 4-110). Stream crossing structures have been analyzed for safety and resource concerns.



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## Direct and Indirect Effects

Each alternative in the Licking Creek project would affect the road analysis process differently, depending on the miles of open road that would require maintenance and monitoring of ecological effects. All new roads are proposed to be eliminated after completion of timber harvest and silvicultural activities (which includes recertification of the units as regenerated, usually 3 years after harvest).

### Alternative 1

The existing road conditions would continue, including the current maintenance schedule, under this alternative. Many of the project area roads are used year-round, unless blocked by snow, by Coast Guard personnel. The roads are also used seasonally by hunters and recreationists, who walk or bring motorized vehicles such as ORVs. Most of the project area was designated for Timber Production in the Forest Plan, and it is assumed that harvest activities will occur at some time in the future. The road cards list current conditions that need to be addressed before they deteriorate further, causing possible resource damage and affecting stream and fisheries resources. Eroding road segments not used for the Madder Timber Sale would be on a delayed schedule for maintenance. Road density and number of stream crossings would remain the same.

### Items Common to all Action Alternatives

Under Alternatives 2, 3, and 4, the roads would be constructed as Objective Maintenance Level 2. After completion of the timber sale (and silvicultural activities), the roads would be closed by barrier, bridge removal, or vegetation regrowth, and monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and facilitate future management activities such as timber harvest and recreation. Alternative 5 constructs no new roads.

Road construction could affect hunter success and increase legal and illegal hunting. Additional recreation opportunities would be created by providing new access to forested areas. All alternatives would maintain the road density below the recommended 0.7 miles per square mile, and minimally reduce deer and wolf habitat.

There would be no adverse effect to fish habitat from road construction, road reconstruction, and related activities. There would be no new fish stream crossings of anadromous fish habitat. Alternatives 2, 3, 4 and 5 all replace two bridge crossings of Class II streams and one culvert to correct and restore fish passage. With completion of Alternatives 2, 3, 4 or 5, all structures would provide juvenile and adult salmonid passage in accordance with the Forest Plan. There would be no detectable effects on managed fish species due to road construction, reconstruction, or related activities.

Road location was designed to avoid impacts to high-vulnerability karst.

### Alternative 2

The least amount of road construction, 1.5 miles, would occur under this alternative. The 4.1 miles of reconstruction under this alternative would repair eroding road segments not used in the Madder Timber Sale.

### Alternative 3

Approximately 2.2 miles of new road would be constructed under this alternative. The 4.1 miles of reconstruction under this alternative would repair eroding road segments not used in the Madder Timber Sale.

### Alternative 4

Under this alternative, the largest number of new road construction miles, 5.5 miles, would occur. The 1.65 miles of reconstruction under this alternative would repair eroding road segments not used in the Madder Timber Sale.

### Alternative 5

No new road would be constructed under this alternative. The 4.1 miles of reconstruction under this alternative would repair eroding road segments not used in the Madder Timber Sale.

**Cumulative Effects****Alternative 1**

No activity in the Licking Creek project area would take place under this alternative. The existing road conditions would continue, and eroding road segments not used for the Madder Timber Sale would not be repaired through sale contracts, and would be on a delayed schedule for maintenance. Approximately 36 miles of existing road are in the project area. Approximately 4.1 miles of new road will be built for the Madder Timber Sale, and 0.1 mile for the Mop Point Timber Sale, raising the total road miles in the project area to approximately 40.2 miles. The majority of these would remain in a Maintenance Level 1 status. The main arterial and collector roads would be maintained as Maintenance Level 1 and 2. The new roads constructed under the Madder Timber Sale would be Maintenance Level 1 after completion of harvest. (Refer to the Alternative 1 map, Chapter 2.)

**Alternative 2**

Approximately 4.1 miles of closed road would be reconstructed within the project area, and approximately 1.5 miles of new road constructed under this alternative. Together with the 36 miles of existing road, construction of 4.1 miles under the Madder Timber Sale, and 0.1 mile for the Mop Point Timber Sale, the total road miles in the project area would be approximately 41.7 miles. The majority of these would remain in a Maintenance Level 1 status, while the main arterial and collector roads would be maintained as Maintenance Level 2 or 3. The new roads constructed under the Madder Timber Sale and this alternative would be Maintenance Level 1 after completion of harvest. (Refer to the Alternative 2 map, Chapter 2, and the road cards, Appendix B.)

**Alternative 3**

Approximately 4.1 miles of closed road would be reconstructed, and approximately 2.2 miles of new road constructed under this alternative. Together with the 36 miles of existing road, the construction of 4.1 miles under the Madder Timber Sale, and 0.1 mile for the Mop Point Timber Sale, the total road miles in the project area would be approximately 42.4 miles. The majority of these would remain in a Maintenance Level 1 status, while the main arterial and collector roads would be maintained as Maintenance Level 2 or 3. The new roads constructed under the Madder Timber Sale and this alternative would be maintained as Maintenance Level 1 after completion of harvest. (Refer to the Alternative 3 map, Chapter 2, and the road cards, Appendix B.)

**Alternative 4**

Approximately 1.65 miles of closed road would be reconstructed, and approximately 5.5 miles of new road constructed under this alternative. Together with the 36 miles of existing road, the construction of 4.1 miles under the Madder Timber Sale, and 0.1 mile for the Mop Point Timber Sale, the total road miles in the project area would be approximately 41.75 miles. The majority of these would remain in a Maintenance Level 1 status, while the main arterial and collector roads would be maintained as Maintenance Level 2 or 3. The new roads constructed under the Madder Timber Sale and this alternative would be maintained as Maintenance Level 1 after completion of harvest. (Refer to the Alternative 4 map, Chapter 2, and the road cards, Appendix B.)

**Alternative 5**

Approximately 4.1 miles of closed road would be reconstructed, but no new road constructed under this alternative. Together with the 36 miles of existing road, the construction of 4.1 miles under the Madder Timber Sale, and 0.1 mile for the Mop Point Timber Sale, the total road miles in the project area would be approximately 40.2 miles. The majority of these would remain in a Maintenance Level 1 status, while the main arterial and collector roads would be maintained as Maintenance Level 2 or 3. The new roads constructed under the Madder Timber Sale would be maintained as Maintenance Level 1 after completion of harvest. (Refer to the Alternative 5 map, Chapter 2.)

## Biodiversity and Old Growth

National Forest Management Act (NFMA) regulations (36 CFR 219) define biodiversity as the distribution and abundance of different plant and animal communities and species, and require that fish and wildlife habitats be managed to maintain those species in the National Forests (36 CFR 219.19). The 1997 Tongass Land and Resource Management Plan (Forest Plan) was designed to maintain viable populations of fish and wildlife across the Tongass National Forest for at least 100 years. Old-growth forest habitat plays a key role in maintaining viable populations.

### Affected Environment

#### Old-growth Forest

Old-growth forests of the Tongass contain a diverse mixture of plant and animal species and habitats. The diversity of landforms and drainage patterns influence vegetative cover. Muskegs are characteristic of poorly drained soils, conifer forests of well-drained soils, and sparsely forested areas of intermediate drainage. At a smaller scale, patches of poorly drained, non-forested areas can be found within old-growth stands (Forest Plan Final EIS). Refer to the Silviculture/Timber Management Section and Wetlands/Floodplains section for discussions on forest composition.

Old growth contains a mosaic of older and younger trees with small, dispersed openings, dynamically changing, yet remaining stable as a forested ecosystem (Bormann and Likens 1979, Alaback 1988, Schoen et al. 1988, Franklin 1990). The combination of a dense canopy with scattered small openings (typically 20 to 40 feet across) allows forage to grow under the openings. The large limbs within the canopy intercept snowfall. Stands that develop after clearcut logging of old growth are even-aged (Harris and Farr 1974) and contain a higher percentage of Sitka spruce and a lower percentage of cedars. Clearcutting often results in concentrated, large-scale openings where nearly all trees are felled; in natural disturbances many trees remain standing or partially standing (Hansen et al. 1991).

#### Old-growth Reserves

To maintain viable habitat, the Forest Service established a system of old-growth forest habitat, which includes large, medium, and small Old-growth Reserves (OGRs) to maintain the integrity of the old-growth ecosystem. These OGRs, along with other non-development LUDs, and beach/estuary and riparian corridors provide a reasonable assurance of protecting adequate habitat to maintain viable fish and wildlife populations (Forest Plan). This system is designed to minimize threats to biodiversity while allowing timber harvest in suitable land use designations (LUDs). Small OGRs are designated only in Value Comparison Units (VCUs) where non-development LUDs alone do not meet the Forest Plan's Old Growth criteria (Forest Plan, Appendix K). These small OGRs are designed to maintain forest connectivity between larger OGRs and non-development LUDs. They can be re-evaluated during project analysis, but must include the size, spacing, and habitat composition of OGR criteria (Forest Plan, p.3-82). If small OGRs, as initially mapped in the Forest Plan, fail to meet these criteria, an interagency review is made to recommend changes in their locations and/or boundaries. This is done as part of project planning. An interagency team of biologists representing the Forest Service, U.S. Fish and Wildlife Service, and Alaska Department of Fish and Game cooperatively evaluate the small OGRs in and adjacent to the proposed project areas, and provide a consensus biological recommendation on their design. Beach fringe forest and riparian buffers act as migration corridors between OGRs. Where this has been compromised by past timber harvest or other factors, the Forest Service should maintain additional old-growth habitat.

**Old-growth Reserve in VCU 7460**

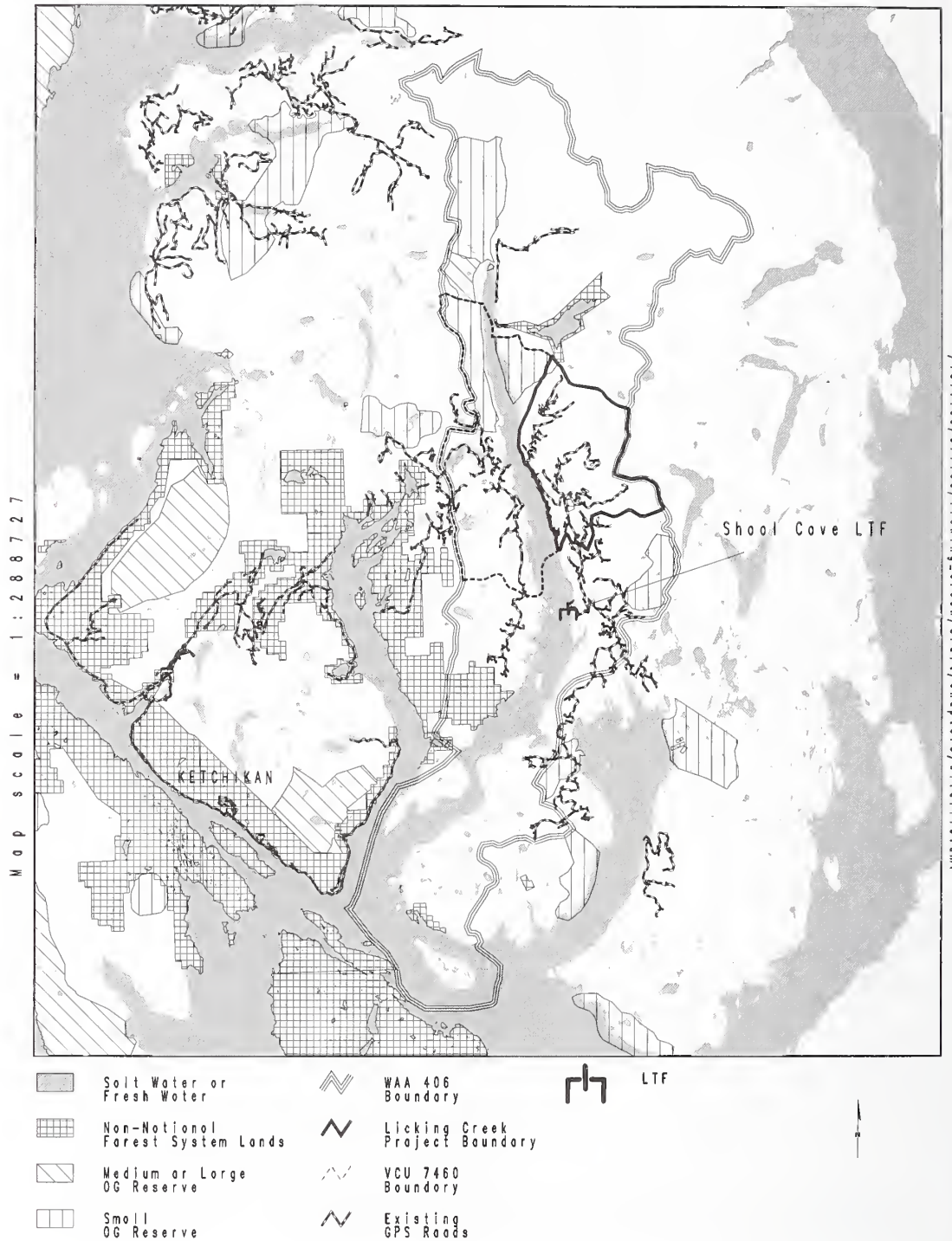
The Licking Creek project area is located in VCU 7460. Two small OGRs occur within VCU 7460 (Figure 3-6). One small OGR is outside the project area on the west side of Carroll Inlet. Less than 1 percent of the Licking Creek project area is within the other small OGR. The small OGR encompasses approximately 5,358 acres (18 percent of the VCU), including 3,109 acres of productive old growth.

The small OGR was reviewed by an interagency team of biologists as part of the Sea Level Timber Sale, for which a Record of Decision (ROD) was signed in 1999. Representatives of the USFWS and ADF&G agreed that the OGR in this VCU met the criteria described in Appendix K of the Forest Plan, and that no additional review is required for the Licking Creek project (S. Brockmann, USFWS and J. Gustafson, ADF&G, concurrence letters 2001). No modifications are planned to the OGRs under the Licking Creek project. Therefore, the project has no effect on small old-growth reserves and this topic will not be analyzed further.



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Figure 3-6  
Old Growth Reserves in the Licking Creek Vicinity



Source: J. Llanos, GIS, 2002

**Productive Old Growth**

Productive old-growth (POG) forest, defined as old-growth-condition forest having a timber volume greater than 8 thousand board feet (MBF) per acre, is valuable for commercial purposes and wildlife. It was estimated to be approximately 9,500 acres within the project area prior to timber harvest, which began about 1954. It was estimated at approximately 20,000 acres within VCU 7460 and 62,000 acres within Wildlife Analysis Area (WAA) 406. As of year 2002, POG remaining after timber harvest (the remaining POG includes other timber sales which have been sold, but as yet are uncut) varies from 69 percent of historical levels within the project area to 83 percent within the Wildlife Analysis Area WAA 406 (Table 3-22). Of the POG currently remaining in the project area, 63 percent is tentatively suitable and available for timber harvest (see the Silviculture and Timber Management section) (some of these acres are in units scheduled to be harvested). The rest of the POG is in beach or riparian buffers, OGRs, other LUDs in which harvest is not allowed, or in areas with steep slopes, unstable soils, isolated stands, visual concerns, etc. (Forest Plan VCU Matrix Appendix 10 5/97).

Low-elevation POG forest (below 1,500 feet in elevation) is the best habitat for many old-growth associated species, including Sitka black-tailed deer, northern goshawks, and American marten. Relocations of radio-marked Alexander Archipelago wolves indicate that they, too, rely heavily on low-elevation habitats. More timber harvest has also occurred in low-elevation habitats than higher elevations. In the Licking Creek project area, 37 percent of the POG below 1,500 feet had been harvested by 2002 (Table 3-22).

**Table 3-22**  
Percent of Productive Old Growth Harvested Between 1954 and Current (2002)

Area	National Forest Acres <sup>1</sup>	Productive Old Growth			Productive Old Growth below 1,500 feet		
		Pre-1954 acres <sup>3</sup>	Year 2002 (current) acres <sup>2</sup>	(% of 1954 acres)	Pre-1954 acres <sup>4</sup>	Year 2002 (current) acres <sup>2</sup>	(% of 1954 acres)
Project Area	14,321	9,500	6,576	69%	7,600	4,761	63%
VCU 7460	30,525	20,000	15,201	76%	17,700	13,068	74%
WAA 406	122,804	62,000	51,282	83%	53,900	43,431	81%

<sup>1</sup> National Forest System land acres. Does not include lakes, saltwater, or other ownerships.  
<sup>2</sup> Includes NEPA-cleared and sold Sea Level units that have not yet been harvested.  
<sup>3</sup> Approximate POG acres  
<sup>4</sup> Approximate low POG acres  
Source: GIS, 2001, 2002

High-volume POG forest below 1,500 feet in elevation is important winter habitat for most of the management indicator species listed in the Forest Plan and in the Licking Creek project area. It receives the greatest HSI values within the deer and marten models. See the Wildlife section of this Chapter and the Wildlife resource report for discussions on the effects of timber harvest on these species and related habitat reductions.

Coarse canopy forests have the structure typically associated with old growth forests: canopy gaps, fewer and larger trees, and a multiple-layer canopy. They provide a high level of snow interception and are therefore especially important during the winter. Caouette, Kramer, and Nowacki (2000) analyzed the differences between various methods of describing forest stands at a large scale. The current method of describing high, medium, and low volume strata, although appearing to be satisfactory to describe volume, was less accurate for identifying structure characteristics. Their analysis showed that volume class designations may more accurately portray forest stand structure, and that volume classes 6 and 7 could be used to estimate coarse canopy forest. (Volume classes are discussed further in the Silviculture and Timber Management section.) Almost 6 percent of the POG in the project area is in volume

# 3 Environment and Effects

## Habitat Corridors and Connectivity

class 6 (Silviculture Table 3-34), and approximately 37 percent of this acreage is contained in a non-harvest LUD or protected from harvest by Forest Plan Standards and Guidelines.

Habitat corridors between blocks of old-growth forest can be important to minimize the isolation and decline of wildlife populations within the blocks (Harris 1984, 1985; Hunter 1990). The Forest Plan provides for corridors between large and medium Old-growth Reserves and other non-development LUDs at the landscape scale. Small OGRs, beach fringe, estuary, riparian buffers, and areas deemed inoperable for timber harvest can all act as habitat corridors between old-growth blocks and serve as dispersal corridors between summer and winter habitat. Where beach, estuary, and riparian buffers and other unsuitable lands do not provide sufficient connectivity, additional stands are to be included to create functioning corridors.

Prior to timber harvest, major creek valleys such as Calamity Creek and Marble Creek likely served as migration/dispersal corridors between Carroll Inlet and what is now Misty Fjords National Monument. These valleys originally contained extensive amounts of connected old growth. Timber harvest between 1971 and 1994 disrupted portions of this old-growth connectivity. Approximately 400 acres were harvested within the riparian management zone prior to the Forest Plan. See Fisheries report for breakdown by stream class. Additionally, timber harvest totaling approximately 284 acres in five harvest units occurred in the project area beach buffer between 1954 and 1962. Five of these clearcut units in the beach buffer have resulted in second-growth stands in the "stem exclusion" stage that effectively sever sections of the beach buffer. No further harvest is permitted in beach/estuary, or riparian buffers (Forest Plan). Connectivity was met through the combination of large, medium, and small OGRs in or adjacent to the Licking Creek project area. Additional corridors, identified in the Sea Level EIS, are outside the Licking Creek project area and are not affected.

## Environmental Consequences

## Direct and Indirect Effects of Timber Harvest

The action alternatives for the Licking Creek project propose harvesting between 222 and 693 acres of productive old-growth (POG) forest (Table 3-23), using a combination of even-aged and uneven-aged silvicultural prescriptions (Table 3-35). For old-growth analysis purposes, if a unit was proposed for harvest, we deleted it from the POG acreage, regardless of the silvicultural prescription used. Within the Timber Management LUD, units that do not occur in high-value marten habitat would be harvested by traditional clearcutting, which is the most economically efficient harvest technique. To meet Forest Plan Standards and Guidelines within high-value marten habitat, 10 to 20 percent of the timber would be retained. Trees may be retained in clumps or "islands" within a given unit, or may be more evenly distributed throughout the unit. They may also contribute to areas deferred from harvest activities for other resource concerns, including stream buffers, steep slopes, unsuitable soils, etc. In these units, actual openings in the forest canopy created by timber harvest would be smaller than the overall sizes of units, and some mature trees would remain after harvest. Consequently, the actual reduction in old-growth acres would be somewhat less than displayed.

Of the action alternatives, Alternative 2 would harvest the fewest acres (Table 3-23) and maintain the greatest amount of POG. Alternative 4 would harvest the most POG and maintain the least amount of POG. Alternative 5 is very similar to Alternative 4. The effects of Alternative 3 would be intermediate between Alternatives 2 and 4. The alternatives would have similar effects on low-elevation POG.



Table 3-23  
Effects of Proposed Harvest On Current Productive Old Growth

Alternative	POG Acres Harvested <sup>1</sup>	Percent of Current POG Remaining after Harvest		Low-elevation POG Acres Harvested	Percent of Current Low-elevation POG Remaining after Harvest	
		Project Area	VCU 7460		Project Area	VCU 7460
Alt. 1	0	100	100	0	100	100
Alt. 2	222	97	99	195	96	99
Alt. 3	524	92	97	473	90	96
Alt. 4	693	89	95	660	86	95
Alt. 5	692	89	95	645	86	95

<sup>1</sup> POG Acres do not include low-productivity (less than volume class 4) areas within units.  
Source: Current POG acres, J. Llanos 2001, 2002.

In general, there is an inverse relationship between timber harvest and habitat capability. As more old growth is harvested, the greater the reduction in carrying capacity for old-growth dependent species. Project effects are relatively minor. Current POG would be reduced by 3 to 11 percent within the project area and by 1 to 5 percent within VCU 7460. In all alternatives, the harvest of POG is 1 percent or less at the WAA level. However, the majority of POG and high-volume POG within the project area and VCU 7460 will remain protected as part of the OGR system. Therefore, although all action alternatives propose to harvest old-growth forest habitat, none is anticipated to directly impact the old-growth ecosystem to a degree at which biological diversity or population viability would be compromised.

Of the action alternatives, Alternative 2 would harvest the least amount (9 percent) of coarse canopy old growth, followed by Alternative 5 (23 percent), Alternative 4 (26 percent), and Alternative 3 (28 percent) (Table 3-24).

Table 3-24  
Harvest of Coarse Canopy Old Growth by Alternative

POG	Acres of Coarse Canopy <sup>1</sup>			Acres of Coarse Canopy in Proposed Harvest				
	Total	Harvest not permitted <sup>2</sup>	Timber harvest permitted	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
6,576	367	231.5	135.5	0	34.1	104.4	93.8	85.4

<sup>1</sup> Volume classes 6 and 7

<sup>2</sup> Includes lands protected by non-harvest LUDs as well as those protected under Standards and Guidelines  
Source: C. Tighe, 2002

#### Alternative 1

Alternative 1, No Action, has the least impact among the Licking Creek alternatives. It would maintain the current old-growth acres and patch size.

#### Alternative 2

Alternative 2 would have the least effect of the action alternatives on old-growth habitat. It harvests fewer acres of POG and maintains more coarse canopy old-growth forest than Alternatives 3, 4 or 5.



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#### Alternative 3

Alternative 3 is intermediate of the action alternatives in its effects on old-growth habitat. It would harvest more acres than Alternative 2, but less than Alternatives 4 and 5. However, it proposes to harvest the most coarse canopy old-growth acres.

#### Alternative 4

Alternative 4 would have the greatest effect on old-growth habitat of the action alternatives. It would harvest the greatest amount of POG and low-elevation POG, and would harvest the second-largest amount of coarse canopy old-growth acres.

#### Alternative 5

Alternative 5 is very similar to Alternative 4. It would harvest only one less acre of POG than Alternative 4. However, it proposes to harvest less low-elevation POG and fewer acres of coarse canopy old growth, which are key habitats.

#### Cumulative Effects of Timber Harvest

We calculated the cumulative reductions in project area and VCU POG that would result from the Licking Creek alternatives and other planned timber sales in the VCU (Table 3-25). These reductions were based on the estimated pre-harvest (1954) acres of POG. If a unit was proposed for harvest, we deleted it from the POG acreage, regardless of the silvicultural prescription used. This results in a conservative, or "worst case", estimate of the impact of timber harvest on old-growth forest habitat.

Table 3-25

Percent of Historical Productive Old Growth Remaining After Additional Timber Sales are Cut

Cumulative Action	Percent of 1954 POG remaining after harvest		
	Project Area	VCU 7460	WAA 406
Other Sales + Lick Cr Alt. 1	67%	73%	81%
Other Sales + Lick Cr Alt. 2	64%	72%	80%
Other Sales + Lick Cr Alt. 3	61%	71%	80%
Other Sales + Lick Cr Alt. 4	59%	70%	80%
Other Sales + Lick Cr Alt. 5	59%	70%	80%

Source: J. Llanos 2001, 2002; Sea Level harvest acres implemented Unit Cards; Mop Pt./91 Knot Timber Sale Report

Alternative 2 would have the least effect on POG, and Alternative 4 the greatest. Alternative 4 would maintain over half of the historical POG within the project area and over two-thirds of the historical POG within VCU 7460. Low elevation would be slightly less.

The Forest Plan, as previously discussed, includes a Forest-wide habitat conservation strategy designed to provide reasonable assurance of protecting adequate habitat to maintain viable fish and wildlife populations. In addition, all applicable Forest Plan Standards and Guidelines that are also integral parts of the strategy—such as riparian management areas, beach and estuary fringe protection, landscape connectivity, and marten guidelines—are fully incorporated into the Licking Creek project action alternatives. Therefore, it is anticipated that forest management activities on the Licking Creek project area would not pose a significant threat to the viability of populations representing the biodiversity of the old-growth ecosystem on National Forest System lands. (See the Wildlife and Threatened, Endangered and Sensitive Species sections for further information on how reductions in old growth affect wildlife populations.)

## Geology, Minerals, and Karst

This section provides an overview of the geology, minerals and karst resources of the Licking Creek project area. Information from the Forest Service's GIS database, and field surveys of the project area were used. A Forest-wide treatment of geology, minerals and karst resources may be found in the Forest Plan Final EIS, Chapter 3, and the Forest Plan, Chapter 4 and Appendix I. The unit and road cards (Appendix B of this Draft EIS) contain additional site-specific mitigation for implementation.

### Affected Environment

#### Geologic Setting

The Licking Creek project area is predominately underlain by metasedimentary and metavolcanic rocks from the Mesozoic and Paleozoic geologic periods (Figure 3-7). These rocks outcrop as dark-gray, silvery-gray, or greenish-gray phyllite and semischist, interbedded with white, dolomitic marble and grayish-blue and white banded marble. These rocks were intruded by granite in the Cretaceous period. The rock units have been intensely folded, are nearly vertically dipping and offset by major northeast-southwest trending faults, and have been subsequently glaciated, weathered, and eroded. The glacial ice sheet flowed over the more-resistant granite and deeply scoured the less-resistant sedimentary and volcanic rocks, creating deep, narrow valleys occupied by long, linear lakes. More recent volcanic activity spewed rocks and ash (basalts, andesites and pyroclastic deposits) onto this heavily glaciated landscape. Karst landforms and drainage systems have developed within the marble and dolomite outcrops to varying extent. Some erosional or gas pocket caves have been identified within the recent ash deposits.

#### Minerals and Mining Claims

The U.S. Bureau of Mines, during field investigations from 1990 to 1994, did not find any mines, prospects, or mineral occurrences within the Licking Creek project area (Maas et al. 1995). The Sealevel Mine and associated prospects lie just south of the project area. These claims and prospects were mined from 1897 to 1940, and yielded gold from sulfides in quartz veins within the metasedimentary and metavolcanic rocks (Maas et al., 1995).

Bureau of Land Management mining claim activity reports indicate that there are no mining claims currently within the project area. Their records show there are five patented mining claims within the project area, in lower Marble Creek. These claims were first staked in 1902, on white, dolomitic marble, and were patented in 1924.

### Karst Resources

Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms that develop by the action of water on soluble rock (limestone and marble in Southeast Alaska). The dissolution of the rock results in the development of internal drainage, producing sinking streams (streams that sink into the stream bed or karst features), closed depressions, sinkholes, collapsed channels, and caves (White et al. 1995).

The geology and climate of Southeast Alaska are particularly favorable for karst development. Extensive areas of very pure carbonate, approximately 515,000 acres, are found within the boundaries of the Tongass National Forest. Because of fractures in the carbonates, high annual precipitation, and peatlands adjacent to the carbonate bedrock, karst has developed, to varying extent, within all carbonate blocks. The Tongass National Forest contains the largest known concentration of dissolution caves in Alaska.

#### Forest Plan Standards and Guidelines

Karst lands impose special land management challenges. Recognizing this, the Tongass National Forest incorporated Karst Management Standards and Guidelines into the Forest Plan.

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These Standards and Guidelines categorize karst areas by their vulnerability to being adversely affected by management activities. Vulnerability is a function of the extent of karst development, the openness of the karst system, and the sensitivity of other resources that benefit from the karst groundwater systems. Within the project area, karst vulnerability is characterized as follows:

**Low Vulnerability:** These carbonate areas have been modified by glaciation, are highly weathered, or show limited karst development. They may be underlain by dolomitic limestone or marble. Dolomite dissolves more slowly than limestone, and is suspected to retard karst development when present. Within the project area, these areas generally occupy the lower third of the glacial valleys, and have a deep (over 40" deep) covering of glacial till with limited epikarst showing. Surface drainages may be present. Low-vulnerability karst lands have no karst-specific management restrictions.

**Moderate Vulnerability:** These areas have moderate- to well-developed epikarst (karst visible on the surface). They tend to be on the upper two-thirds of the valley slopes. The epikarst valleys are filled or partially filled with residual soil and/or glacial till. On dolomitic marbles, small surface streams flow across less-permeable beds, sometimes sinking for a short distance and continuing on the surface thereafter. These lands are unlikely to introduce organic sediment and debris into the underlying karst hydrologic systems. Partial-suspension harvest systems are required to minimize soil disturbance.

**High Vulnerability:** These areas include all collapsed karst features, caves, sinking streams and resurgences, and the small, high-gradient watersheds that flow into these features. Also considered high vulnerability are karst lands in which the epikarst is well- or extremely well-developed, with predominately very shallow organic and mineral soils. They tend to occur at higher elevations. These features can move organics, sediments, and debris down very rapidly into the underlying karst hydrologic systems if disturbed. The entrance area surrounding resurgences should be protected to maintain the quality of the water flowing from them. High-vulnerability karst land is considered unsuitable for timber management and is removed from the suitable land base.

#### Karst in the Project Area

The project area is underlain by marble and dolomitic marble (1,892 acres), and karst drainages have developed (though are sometimes limited) in all the marble (carbonate) blocks (Figure 3-8). Past timber harvest has occurred on 856 acres (45 percent) of karst lands in the project area, of which 661.7 acres (77 percent) was on dolomite. Portions or all of proposed harvest Units 10, 33, 34, 35, 40, 64, 65, 67, and 71 are underlain by marble.

Karst development seems to be limited in the "main" carbonate band, which underlies proposed harvest Units 40, 64, 65, 67, and 71. Chemical analysis of three samples from this carbonate band show it to be dolomitized (Maas et al., 1995). It is suspected that dolomitization has in some way suppressed karst development. The undulating topography characteristic of a karst landscape is present but visible epikarst fractures and collapse features are not prevalent. Small surface streams flow across the forest floor on top of the dolomite.

Extensive karst and cave systems have developed in the easternmost marble band in the project area. The high-vulnerability karst lands associated with this marble band were deleted from the proposed harvest units. A portion of harvest Unit 34 is underlain by a moderately vulnerable part of this marble band.

Drainages disappear along the margins of the faulted marble blocks, and sinkholes and other collapsed features are found across the surface of the karst plateaus. Of the 1,892 acres of carbonate in the project area, 288.9 acres have been mapped as high vulnerability.



## Environmental Consequences

### Direct and Indirect Effects

#### Effects on Minerals

The proposed action would have no direct impacts on mineral resources. Geologic mapping would be enhanced by increased exposure of rock due to road construction and quarry development. With better exposures of the rock, new mineral discoveries become possible. The chemically pure carbonates of Alaska have long been considered for their commodity values. The more pure the carbonate bedrock, the more intense karst development may be. The impacts of any proposed mineral development within the karst landscape would be analyzed once a plan of operation was received. However, on karst lands found to be of unquestionably high vulnerability, mineral development would not be appropriate.

#### Effects on Karst

Karst lands have separate issues and concerns from other landforms because karst is a three-dimensional landform with closely integrated surface and subsurface processes. Groundwater flows relatively slowly through porous rock and soil, or through fractures, in non-karst terrain. In karst terrain, groundwater may flow relatively quickly through complex underground systems of fissures and caves. Concerns primarily involve potential changes of groundwater flow in these underground systems. Any management activity that causes sediment or organic debris to build up in the subsurface drainage system decreases its capacity and makes it more likely that surface streams will form. Similarly, any management activity that increases the volume of water flowing underground can also make surface flow more likely.

Primary impacts from past timber harvest have been from sediment transport into karst systems, due to the size of harvest blocks and the rate at which the landscape was harvested. The initial flush of sediment and debris, immediately after harvest with the first storm cycles, is believed to have delivered the majority of the material into the karst systems. Sediment has been transported underground to distant springs, and due to blockage of underground passages, surface stream flow and erosion has increased in some areas. Current harvest practices lessen these effects. These include partial cutting, reduced harvest unit size, logging systems that achieve at least partial suspension, and extending the rotation period.

The proposed timber harvest is not expected to have significant long-term effects on water flow in the Licking Creek project area. The removal of forest vegetation reduces both the evaporation and transpiration of water from a site, temporarily increasing the water available for surface or subsurface flow until the vegetation grows back. This can increase groundwater recharge, and surface water flow during major rainstorms could occur more frequently. However, due to rapid re-vegetation, the limited size and broad distribution of proposed harvest units, and the 100-year rotation period, these effects would be temporary, and permanent hydrologic changes are not expected.

#### Mitigation

A karst resource assessment was used to plan timber harvest on the karst lands in the project area. Forest Plan Standards and Guidelines, best management practices (BMPs), and site-specific mitigation have been used to minimize adverse effects to karst. Following Forest Plan Standards and Guidelines, high-vulnerability karst lands were excluded from harvest. Specific drainages that flow into identified karst features would also be protected.

High-vulnerability karst blocks and features were excluded from harvest, and buffered to maintain their integrity and biological function. Traditional buffers of 100 feet beyond the slope break surrounding a feature were modified to include an additional buffer to provide a "reasonable assurance of windfirmness." A distance of two tree heights was applied as a minimum buffer. Portions of Unit 64 (6.3 acres) and Unit 10 (12.4 acres) will be removed from the suitable timber base, and the boundaries of Unit 22 and Unit 35 were modified to exclude high-vulnerability karst. Karst features identified in Unit 71 will be buffered and the road re-aligned to protect the features during final layout and design.



# 3 Environment and Effects

Roads were designed to avoid impacts to high-vulnerability karst. In addition, steep phyllite slopes between a high-vulnerability karst band and Unit 35 were removed from consideration for harvest because of slope stability and sedimentation concerns, and to protect the karst systems at the slope's base.

No special mitigation is needed for timber harvest on low-vulnerability karst. It was determined that the moderate-vulnerability areas would be suitable for timber harvest with use of partial suspension harvest systems to minimize soil disturbance. Should the partial harvest areas in the selected units remain windfirm, there should be few threats to the karst features within the project area. These mitigations are specified on the unit and road cards (Appendix B); the need for some requirements would be determined during project layout.

## Direct and Indirect Effects of the Alternatives

### Alternative 1 (No Action)

Timber harvesting and related activities are not proposed within the project area as part of Alternative 1. Natural erosion and transport processes, including mass wasting, surface erosion, and stream erosion, would continue. All of these natural processes contribute sediment to karst systems.

### Alternative 2

Among the action alternatives, Alternative 2 proposes 15.4 acres of harvest on carbonate rock and low- and moderate-vulnerability karst (of which 9.0 are on dolomite), 0.7 mile of road reconstruction, and 0.1 mile of new road construction on carbonate rock (Table 3-26). This is a 1 percent increase over total past harvest, and a 1 percent increase in total road miles (open and closed), on carbonate rock within the project area.

### Alternative 3

Alternative 3 proposes 139.7 acres of harvest on carbonate rock and low- and moderate-vulnerability karst (of which 130.9 are on dolomite), 0.7 mile of road reconstruction, and 0.2 miles of new road construction on carbonate rock (Table 3-26). This is a 7.4 percent increase over total past harvest, and a 2 percent increase in total road miles (open and closed), on carbonate rock within the project area.

### Alternative 4

Alternative 4 proposes the greatest acres of harvest on carbonate rock and low- and moderate-vulnerability karst (234.1 acres, of which 215.4 are on dolomite), 0.7 mile of road reconstruction, and the most miles of new road construction (1.7 miles) on carbonate rock (Table 3-26). This is a 12.4 percent increase over total past harvest, and a 16 percent increase in total road miles (open and closed), on carbonate rock within the project area.

### Alternative 5

Alternative 5 proposes 194.5 acres of harvest on carbonate rock and low- and moderate-vulnerability karst (of which 184.9 are on dolomite), 0.7 mile of road reconstruction, and no new road construction. This is a 10.3 percent increase over total past harvest on carbonate rock.

## Cumulative Effects

### Alternative 1 (No Action)

Timber harvesting and related activities are not proposed within the project area as part of Alternative 1. The Madder Timber Sale, which has been sold, will harvest 111 acres and build 1.7 miles of new road on carbonate rock. No harvest or roadbuilding on karst is planned as part of the Mop Point/91 Knot Timber Sales. The cumulative total of past and planned harvest on carbonate acres is 51 percent, and 10.2 miles of road on carbonate (Table 3-26).

### Alternatives 2, 3, 4, and 5

The cumulative total of past, planned and proposed harvest on carbonate varies from a low of 51.9 percent (Alternative 2) to 63.5 percent (Alternative 4), and the cumulative total of existing, planned and proposed roads on carbonate varies from 11.0 miles (Alternative 2) to 12.6 miles (Alternative 4) (Table 3-26). Alternative 2 would have the least effect on karst acres, and Alternative 4 the greatest.

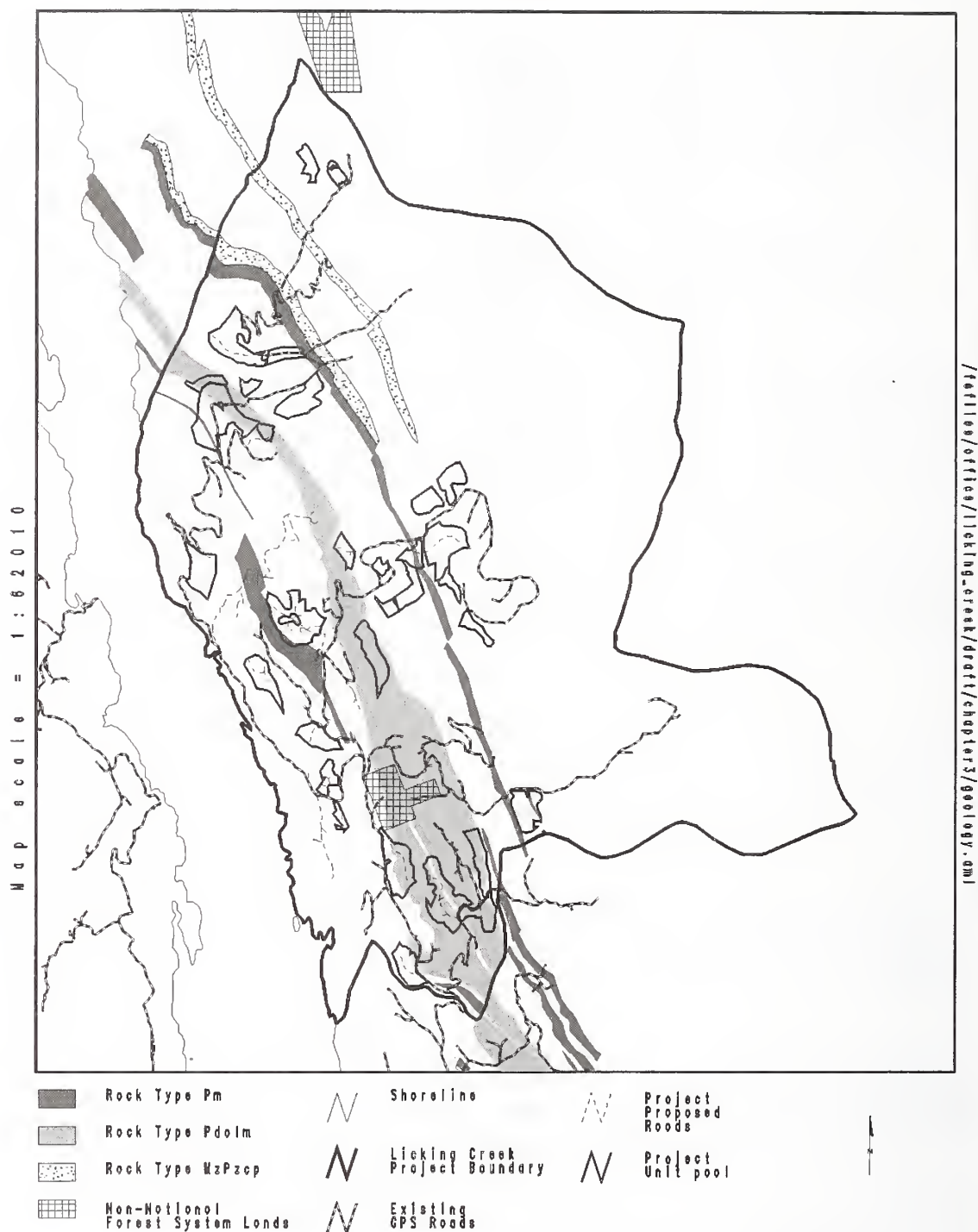
**Table 3-26**  
Effects of the Alternatives on Low- and Medium-vulnerability Karst Lands in the Licking Creek Project Area

	Alt. 1 No Action	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Past harvest on karst (acres)	856.0	856.0	856.0	856.0	856.0
Proposed harvest on karst (acres)	0	15.4	139.7	234.1	194.5
Proposed harvest on karst due to Madder Timber Sale (acres)	111.0	111.0	111.0	111.0	111.0
Cumulative percent of karst harvested <sup>1</sup>	51.1	51.9	58.5	63.5	61.4
Existing road on karst (miles)	8.5	8.5	8.5	8.5	8.5
Road on karst planned to be built for Madder Timber Sale (miles)	1.7	1.7	1.7	1.7	1.7
Road on karst to be reconstructed (miles)	0	0.7	0.7	0.7	0
Proposed new road on karst (miles)	0	0.1	0.2	1.7	0
Cumulative miles of road on karst <sup>1</sup>	10.2	11.0	11.1	12.6	10.2

<sup>1</sup> From proposed, scheduled and past harvest activities (1,892 acres total karst)  
Source: J. Llanos, GIS, 2002

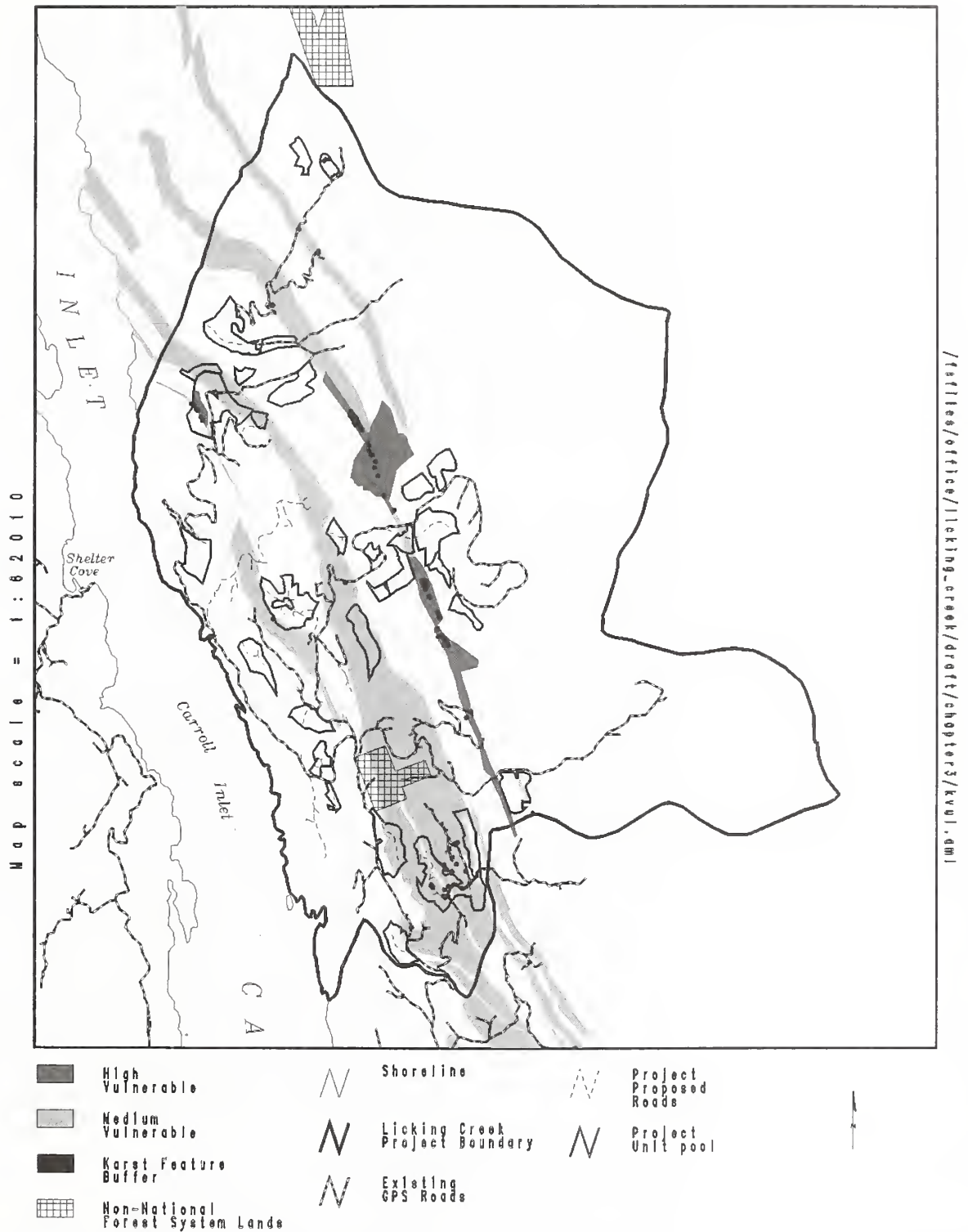
# 3 Environment and Effects

Figure 3-7  
Geology Rock Types in the Licking Creek Project Area



Pm = Paleozoic marble; Pdolm = Paleozoic dolomite; MzPzcp = Mesozoic/Paleozoic calcareous phyllite  
Source: J. Llanos, 2002

Figure 3-8  
Karst Vulnerability in the Licking Creek Project Area



Source: J. Llanos, 2002

/estiles/office/licking-creek/draft/chapter3/kvul.dml



## Heritage Resources

Heritage resources include all evidence of human-related activity, dating from the earliest beginnings to the fairly recent past. In accordance with the National Historic Preservation Act of 1966 (as amended), and the implementing regulations (36 CFR 800), the Tongass National Forest is undertaking a program to identify, evaluate, preserve, and protect heritage resources as a nonrenewable National heritage. The purpose of these investigations is to identify any possible impacts that proposed activities would have on recorded heritage resources in the area that may be eligible for inclusion in the National Register of Historic Places.

### Background

#### Cultural History of the Project Area

Southern Southeast Alaska has a unique cultural history, which includes the potential for occupation dating from the Paleomarine-Early Prehistoric Maritime period (10,000 B.C. to 4500 B.C.), through the Northwest Coast Developmental Phase - Late Prehistoric Maritime (4500 B.C. to A.D. 1700), to the protohistoric-historic Tlingit (A.D. 1700 to A.D. 1746). Prehistorically, extensive use of the rugged terrain in the vicinity of the project area is indicated. In the vicinity of Carroll Inlet and Thorne Arm, we have identified a number of fish traps, both stone and wood-stake fish weirs, middens, and rock art sites, along with historic sites, which include mines, cabin sites, a fox farm and culturally modified trees. However, only one site, KET-423, has been located within the boundary of the Licking Creek project area.

The project area is included in the traditional homeland of the Tlingit. Immediately prior to European settlement, the project area was occupied by two Southern Tlingit groups, the Saanyakwaan (also referred to as Saxman or Cape Fox Tribe) and the Taantakwaan (also referred to as Tongass or Ketchikan Tribe). The northern half of Revillagigedo Island was also apparently occupied at one time by the Xetlkwaan (Foam House People or the Stikine Tribe), who now reside in the Wrangell area.

The original territory of the Cape Fox Tribe (from north to south) included the southwest portion of the Cleveland Peninsula, the southern half of Revillagigedo Island, and the west coast of the mainland south to the Portland Canal area (Goldschmidt and Haas 1946). Originally centered on one-third of southern Prince of Wales Island, the Tongass Tribe migrated east about 1720. This eventually led to major conflicts between the Tongass, Cape Fox, and Stikine Tribes in the early part of the nineteenth century. As a result, the Stikine abandoned the area and moved to Wrangell, their territory absorbed by the Cape Fox; the Tongass displaced the Cape Fox from their southern territory and the southwest coast of Revillagigedo Island. By the end of the nineteenth century, however, due to increased Euro-American influence in the area, both groups consolidated and established separate settlements on the southwest coast of Revillagigedo Island: the Tongass at the present day city of Ketchikan, and the Cape Fox at Saxman (Arndt, Sackett and Ketz 1987).

The written cultural history in Alaska began with the second Kamchatka Expedition of Vitus Bering in 1741 and developed through various stages of contact with European people and goods. Historic explorations in the project vicinity occurred in 1792, with the Jacinto Caamano expedition, and in 1793, when George Vancouver's long boats explored Behm Canal from Port Protection where the British ships Discovery and Chatham were anchored (Mobley 1989).

## Affected Environment

#### Heritage Resources Inventory

The Licking Creek Inventory strategy involved a pre-field investigation literature search; government-to-government consultation with the Ketchikan Indian Corporation (July 20,

2001), the Saxman IRA (August 13, 2001), and the Metlakatla Indian Community (November 1, 2001); and consultation with two tribal Elders, Martin Perez from Saxman and Flora Feller from the Tongass Tribe. These consultations within the Native community are continuing. Previous work within the Licking Creek project area and vicinity has provided a significant amount of information about heritage resource activities and locations. This work included surveys conducted in the project area and vicinity from 1978-1995. Additional surveys were conducted for this project in 2001. Field investigations were focused on the High Sensitivity Zone, which are areas from sea level to 100 feet in elevation, karst areas, areas associated with oral histories, previously mined areas, passes and portages, and the shores of certain streams and lakes. Surveys also sampled other areas with a low likelihood to contain heritage resources.

Only one heritage site, KET-423, a small prehistoric midden site, was identified in the project area. Specific location information is protected to prevent vandalism or unauthorized use of this site. No proposed harvest units are located within the high-sensitivity zone under any of the action alternatives.

These results have been documented and forwarded to the State Historic Preservation Officer (SHPO) for review as required by the National Historic Preservation Act and 36 Code of Federal Regulation 800. The SHPO review has been completed for the proposed activity in the Licking Creek project area, with a determination that no sites eligible for the National Register of Historic Places will be affected.

## Environmental Consequences

### Direct and Indirect Effects

Heritage resources may be impacted from natural forces (such as erosion), public access, or project-related activities. The construction and reconstruction of roads can lead to an increase in public use of heritage resources. Such increased use can destroy cultural resource sites through inadvertent damage caused by compaction or other ground-disturbing activities, or direct damage from vandalism (relic collecting, defacement, and theft). Protection of significant cultural resource sites includes the establishment of public education programs, maintaining confidentiality about specific site locations, monitoring, and directing the public away from the most vulnerable sites.

In previous consultation regarding the Sea Level EIS, and on January 14, 2002 for the proposed Licking Creek EIS, the SHPO determined that cultural resource site KET-423 was "Eligible" for the National Register of Historic Places, and concurred that there would be no effect to significant heritage resources. The proposed Licking Creek timber harvest activities are designed to ensure that no timber harvest, road construction or any other proposed activity is planned within the proximity of this significant site under any of the proposed alternatives and these proposed activities would not affect significant heritage resources. Under all action alternatives, cultural resource site KET-423 would be monitored by archaeologists throughout the life of the timber sale to ensure that the site is protected.

### Cumulative Effects

Cumulative effects on heritage resources occur through natural erosion and weathering as well as from continued development near lands containing heritage sites. Development activities of all kinds pose particular threats to heritage resources, as such activities tend to be located in the same areas that heritage resources are found, such as sheltered coastal settings.

It is impossible to determine the exact nature of resources that may have been previously disturbed in the project area. Intensive cultural resource investigations and mitigation measures have been implemented only since the 1980s. Current research and survey designs are based upon the results of previous work and modern methodology and technology. These methods, combined with various mitigation measures, are designed to preserve significant sites and provide data that will guide future research and resource management.

# 3 Environment and Effects

## Mitigation

Protection of significant heritage resource sites begins early in the planning process when, in accordance with Section 106 of the National Historic Preservation Act (NHPA), a heritage resource survey is conducted to locate any significant archaeological, historical or traditional use sites, evaluate their significance, and determine the potential effects of a proposed project on the resources. This is done in consultation with the SHPO prior to project implementation. Culturally sensitive site-specific information, acquired either through literature search or through consultations with tribal governments and knowledgeable individuals, is kept confidential and protected by statute under the Archeological Resources Protection Act (ARPA) and/or by formal agreements.

Should previously undiscovered archaeological or historical sites be discovered, after the Section 106 process has been completed and project activities are implemented, project activities would be discontinued at the location of the discovery until a professional archaeologist completes a site evaluation. Mitigation measures would be agreed upon and implemented before activities may proceed.

There is also the potential to discover human remains and associated funerary objects, which might include mortuary poles, jewelry, beads, mortuary boxes, and associated clan crest items. If human remains, objects of cultural patrimony or sacred objects, as defined by the Native American Graves Protection and Repatriation Act (NAGPRA) are discovered, the process to be followed in the handling of these remains and cultural items is outlined specifically in 43 CFR 10 Subsection 10.4.

If human remains were discovered during ground-disturbing activities, no further excavation or disturbance would occur in the immediate area. Human remains and any associated funerary objects would not be excavated or removed without consultation with the Tribal Government representatives. The immediate securing and protection of the discovered remains would be accomplished as appropriate for each circumstance. To the extent possible, notification of Tribal Government representatives, the coroner, and the State Troopers would occur within 24 hours of the discovery. To insure appropriate respect, protection, treatment and care, a professional archaeologist would be present during any subsequent inspections or activities.

Appointed Tribal Government representatives would be given the opportunity to be present for examination of the site and would participate in the formulation of a signed mitigation plan, which would detail the further treatment of the remains prior to any further actions. If by consensus, the site and/or human remains are to be covered and remain undisturbed, then the project activity would be moved or redesigned to insure protection. Should removal and/or scientific study be the preferred mitigation, then a report would be compiled that details methods, descriptions, analysis, drawings, photographs, maps and other details or results which would complete the documentation. The final report would be made available to the Tribal Government(s) for review. Upon completion of any analysis, the Forest Service would assist in the reburial of the remains and the conservation and curation of cultural items with a museum which has the ability to properly preserve and curate those items as specified in the signed mitigation plan.

Monitoring of sites determined to be eligible for the National Register of Historic Places would occur throughout all aspects of ground-disturbing activities associated with the proposed project. The frequency of monitoring activities would be determined on a case-by-case basis, which would depend upon the significance of each site, and the sensitivity of the site location to potential damage from recreational use, natural erosion or project activities. Under normal circumstances, National Register eligible sites are monitored in conjunction with other survey work in the vicinity, or annually, unless other protective measures are warranted. These measures may include administrative closure, signing, increased inspection, law enforcement investigation, stabilization, and/or data recovery.

Effectiveness monitoring of the project area may include a sample of high-sensitivity locales within direct impact areas during and/or after the actual ground disturbance, and post-

disturbance monitoring of a sample of lower-sensitivity locales in areas of actual ground disturbance. The locations and acreage sampled will be determined on a case-by-case basis.

The implementation of these measures throughout project planning and during the harvest activities would provide a high level of protection for significant heritage resources.



## Log Transfer Facilities and Related Sites

### Background

Southeast Alaska's coastline consists of approximately 30,000 miles of tidal shoreline, which is roughly 60 percent of the total Alaskan coast. Within this region, a variety of habitats comprise Southeast Alaska's estuary and tidal environments. Shallow marine waters, mud flats and estuaries provide habitat for shellfish and juvenile salmon. They are part of a complex and dynamic ecosystem that also includes shrimp, flatfish, marine worms, echinoderms, sponges, sea anemones, shellfish, plankton, marine algae, and other organisms.

Log transfer and storage facilities are the points of concentrated activity associated with marine transportation of logs. The preferred sites for log transfer facilities (LTFs), log storage areas, camp settlements, and anchorages are deep bays or coastlines along straits or channels. These areas are preferred because deeper water is generally less productive and stronger currents disperse bark and debris that may enter the water; consequently, there would be fewer impacts to intertidal and subtidal marine life in these areas. Other marine habitats are not addressed here because the timber harvest activities of this project are not likely to affect them.

Each LTF requires a log transfer area, a land-to-barge facility, a small airplane and boat dock, an equipment off-loading ramp, and a log raft storage area (for land-to-water transfers). Logs are trucked to the LTF, watered and assembled into rafts. The log rafts are then towed to processing sites such as the sawmills at Ward Cove or Wrangell. Log sortyard areas are usually required for barge facilities where sorting by raft is not possible. These facilities are generally located within close proximity of the LTF to reduce costs and retain impacts within a localized area.

Log transfer facilities are issued an EPA NPDES (National Pollutant Discharge Elimination System) permit and a State of Alaska tidelands lease.

### Affected Environment

#### Shoal Cove LTF

An existing LTF, with a log sortyard, is located at Shoal Cove near the Licking Creek project area (see Alternative 1 map, Chapter 2). The LTF is an A-frame and a land-to-barge facility that required the construction of a rock bulkhead into the water to operate the facility.

Approximately 250 MMBF of timber has been transferred over it since its construction in 1970. The Shoal Cove LTF is an A-frame design, and was designed to maximize the flushing of suspended bark away from the LTF area to the open sea before it could accumulate on the bottom.

The permits for the Shoal Cove LTF require yearly monitoring for bark deposition, to ensure that the area of 100 percent bark cover is less than 1 acre. A SCUBA dive survey was conducted in 2000 (USDA Forest Service, Underwater Bark Debris Survey Sept. 2000). This survey is available in the planning record. The semi-circular shoreline topography at Shoal Cove appears to focus most of the debris accumulation in the area directly in front of the bulkhead, and creates a defined area in which the 100 percent bark cover area will not reach the 1-acre limit, at least within the 60-foot Mean Low Low Water (MLLW) depth limit.

#### Logging Camps

A land or floating camp would most probably be established for use on this project. All alternatives would require temporary maintenance facilities. These areas will be evaluated for development to comply with all State and Federal permitting requirements.

## Environmental Consequences

### Direct and Indirect Effects

#### Effects of Site Bark Deposition

During the transfer of logs from land to water, bark is sloughed off and may be deposited on the ocean bottom. Bark also is continually sloughed off, while the logs are in rafts, by agitation from wind and waves. If the bark accumulates on the bottom it can diminish habitat for bottom-dwelling crustaceans and mollusks, as well as hamper underwater vegetation used as food and rearing sites for fish and other organisms.

Direct impacts to marine benthic habitats from site bark deposition are estimated to remain at current levels (under 1 acre of 100 percent bark cover), or possibly less. As part of the permitting requirements, survey dives are conducted yearly while active.

#### Effects of Structural Embankments

Although conclusive studies are not available for comparison, barge use at LTFs probably has less overall effect on the marine environment than does rafting, because the logs are not stored in the water. Bark and debris would accumulate only in a small area around the extreme seaward end of the facility.

All action alternatives (2, 3, 4 and 5) would use the existing LTF at Shoal Cove. The LTF could also be used for barging at times of high tide, when water depth is adequate. The use of a barge would be optional, under the action alternatives.

### Effects of the Alternatives

#### Alternative 1

No direct effects from timber harvest would result from the No-action Alternative.

#### Alternatives 2, 3, 4, and 5

Action Alternatives 2, 3, 4 and 5 would harvest 10,709, 23,832, 33,556 and 32,261 CCF (approximately 5.4 MMBF, 11.9 MMBF, 16.8 and 16.1 MMBF of timber), respectively. This volume would be transported via the Shoal Cove LTF. Annual dive monitoring of marine environments, as required under permit, would continue for the duration of use of the LTF.

Contract provisions address the use of facilities that may be used by other purchasers. These provisions allow for the joint use of the log transfer sites, rafting areas, scaling areas, sortyards and camp areas. The contract provisions require purchasers to enter into a cooperative agreement specifying the operation and maintenance responsibilities for facilities that will be used with other purchasers.

### Cumulative Effects

#### Alternative 1

The Madder Timber Sale, already sold and which could be completed by 2006, would harvest 54,600 CCF (25.8 MMBF). (This volume includes approximately 10,600 CCF (4.3 MMBF) that is outside of WAA 406). The Mop Point/91 Knot Timber Sale is scheduled to be sold by 2004, with a harvest of 544 CCF (about 272 MBF). Both sale volumes would be transported via the Shoal Cove LTF. Cumulative effects on site bark deposition and structural embankments are expected to remain below permitted levels. Annual dive monitoring of marine environments, as required under permit, would continue for the duration of use of the LTF.

#### Alternatives 2, 3, 4, and 5

Action Alternatives 2, 3, 4 and 5 would harvest 10,709, 23,832, 33,556 and 32,261 CCF (approximately 5.4 MMBF, 11.9 MMBF, 16.8 and 16.1 MMBF of timber), respectively. The Madder Timber Sale, already sold and which could be completed by 2006, would harvest 54,600 CCF (25.8 MMBF). (This volume includes approximately 10,600 CCF (4.3 MMBF) that is outside WAA 406). The Mop Point/91 Knot Timber Sale is scheduled to be sold by 2004, with a harvest of 544 CCF (about 272 MBF). Both sale volumes would be transported via the Shoal Cove LTF. Cumulative impacts to marine benthic habitats from site bark deposition and structural embankments are expected to remain below permitted levels. Annual

# 3 Environment and Effects

dive monitoring of marine environments, as required under permit, would continue for the duration of use of the LTF.

## Recreation

This section summarizes recreation data collected for the Licking Creek Timber Sale and analyzes the effects of proposed harvest and road construction. The Recreation resource report for the Licking Creek Timber Sale project is tiered to the Forest Plan.

### Affected Environment

#### Recreation Demand

The Licking Creek project area was analyzed under the Sea Level EIS and that same information will be used for this analysis. Since the use in this area is dispersed and the Forest Service does not provide or maintain any facilities in this area, use is not recorded on a regular basis.

Southeast Alaska residents place a high value on opportunities for remote, uncrowded outdoor recreation. At the same time, community access is important to those wanting to do more hunting, fishing, and beachcombing. In particular, Ketchikan residents wanted to see an expansion of the usable road system on Revillagigedo Island, primarily for roaded recreation opportunities (Ketchikan Community Survey 1990). Development of new hiking trails and bicycle paths were the most desired opportunities.

#### Existing Activities and Use Patterns

Recreation activities in and near the project area include fresh and saltwater sport fishing, hunting, camping, hiking, beachcombing, wildlife and scenic viewing, and boating (kayak, canoe, or motorboat). Flightseeing trips from nearby Ketchikan to Misty Fiords National Monument (MFNM) are common.

The project area is approximately 20 air miles from Ketchikan, the nearest community, and there is no road connection to Ketchikan. Access is by personal or commercial boat and aircraft. Consequently, the project area receives relatively little use for recreation activities, and there are no developed recreation facilities within the project area. A network of roads (approximately 70 miles) associated with past timber harvest provides access (usually via foot or ATV) to hunters from August through December. Recreationists who reach the project area enjoy viewing wildlife and scenery, and hunting big game and waterfowl. Most recreation use takes place along the saltwater bays within and adjacent to the project area, or along the existing road system.

The Forest Service developed the Recreation Opportunity Spectrum (ROS) system to help identify and describe the variety of recreation settings available on National Forest System lands. The ROS system describes settings that may be affected or changed by various activities, and provides a framework for planning and managing recreation resources. The ROS settings are classified using a scale ranging from Primitive to Urban.

Four different ROS settings are found in the Licking Creek project area. Figure 3-9 shows their location.

**Roaded Natural (approximately 2 percent):** The natural environment of this setting is substantially modified by land use activities. The opportunity to observe and affiliate with other users is common. There is little opportunity for challenge and risk, and self-reliance on outdoor skills is of little importance. The Roaded Natural setting within the Licking Creek project area is located on the far northern end. This area is related to Swan Lake and the power production facilities located there.

**Roaded Modified (approximately 82 percent):** This setting is comprised of a natural environment that has been substantially modified, particularly by vegetative manipulation.

### Recreation Opportunity Spectrum



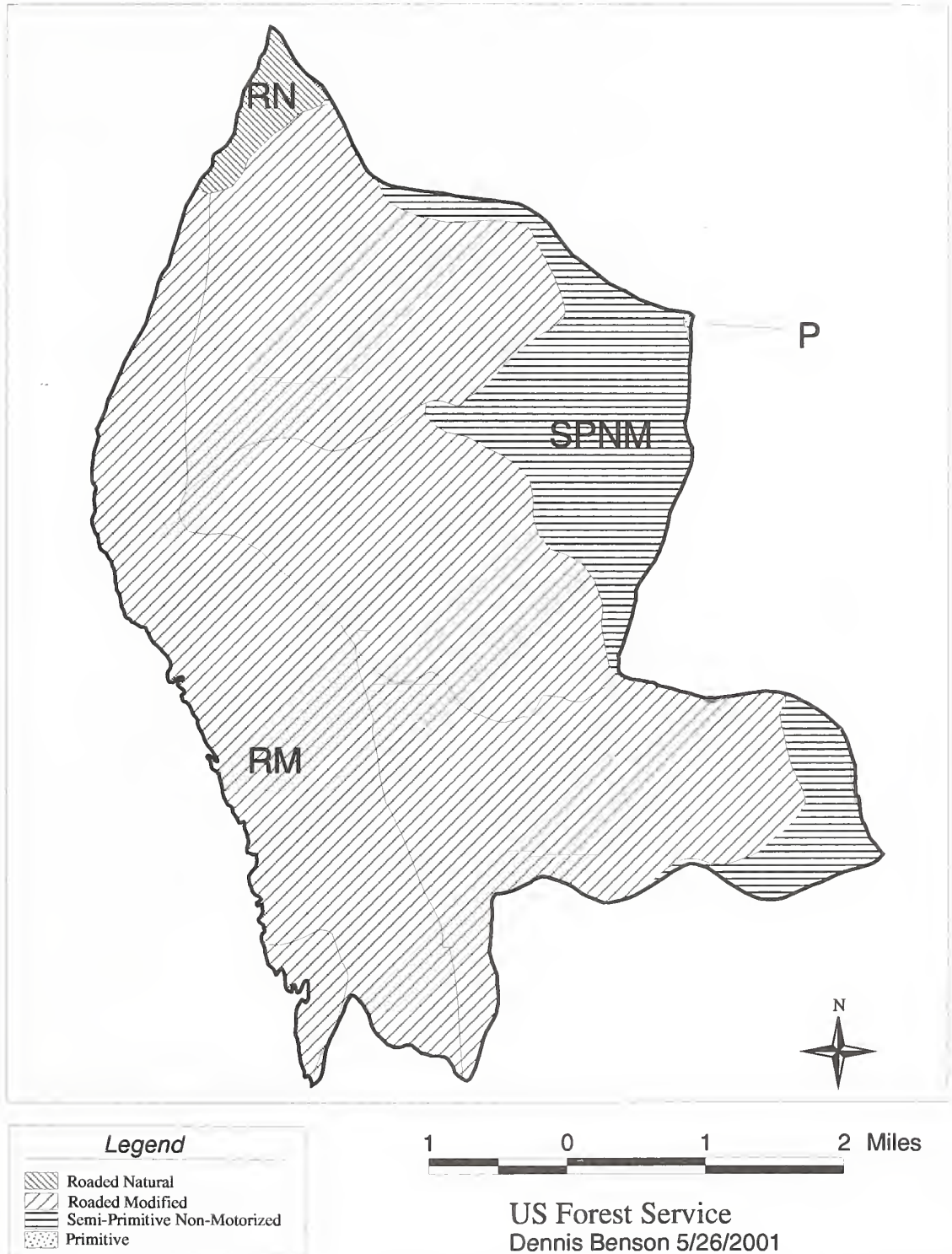
### 3 Environment and Effects

There is strong evidence of roads and/or highways. Frequency of contact is low to moderate. The Licking Creek project area is dominated by this setting. Previous harvest activities and road construction have modified the landscape substantially.

**Semi-primitive Non-motorized (approximately 16 percent):** This setting defines a natural environment where interaction between users is very low and evidence of other users is minimal. This setting makes up the second-largest portion of the planning area. This setting is located along the eastern boundary of the project area, and borders the Misty Fiords National Monument Wilderness. It is mostly high elevation with steep and difficult terrain.

**Primitive (less than 1 percent):** This setting encompasses essentially unmodified natural environment where interaction between users is very low, and evidence of other users is minimal. Motorized use is rare. This area is located along the eastern portion of the project area and is very small. It is related to a much larger primitive area located in the Monument/Wilderness.

Figure 3-9  
Existing ROS Class Inventory Map on the Project Area



Source: D. Benson, 2001

# 3 Environment and Effects

## Recreation Places

A recreation place is identified as a geographic area having one or more physical characteristics attractive to people engaging in recreation activities; it may contain zero to several recreation sites. These places may be beaches, waterfalls, streams, lakes, scenic features, bays, anchorages, existing and potential recreation sites, and trails. Each recreation place has some activity associated with it such as hiking, camping, hunting, or viewing scenery or wildlife. These recreation places define the inventoried recreation areas, which are important for existing and potential recreation uses.

Three recreation places were inventoried within the project area (Table 3-27). Figure 3-10 shows the location of each recreation place and whether it exists (Existing) and currently receives use, or if there is a potential (Potential) for future use.

Table 3-27  
Recreation Places Within the Licking Creek Project Area

Recreation Place	Acres	ROS <sup>2</sup>	Recreation Activities	Recreation Sites <sup>3</sup>	FP LUDs <sup>4</sup>
<b>Existing Recreation Places</b>					
1. Marble Creek	209	RM	dispersed camping, hunting	anchorage (E)	ML
2. Shoreline and Estuary	3,494	RM	boating, saltwater fishing, scenic & wildlife viewing	boat dock (P) anchorage (P)	ML
3. Swan Lake <sup>1</sup>	247	RN	lake fishing, boating, picnicking	anchorage (E) boat dock (E)	OG
<b>Potential Recreation Places</b>					
4. Alpine	700	RM, SPNM & P	hiking, hunting, scenic viewing	(N/A)	TM

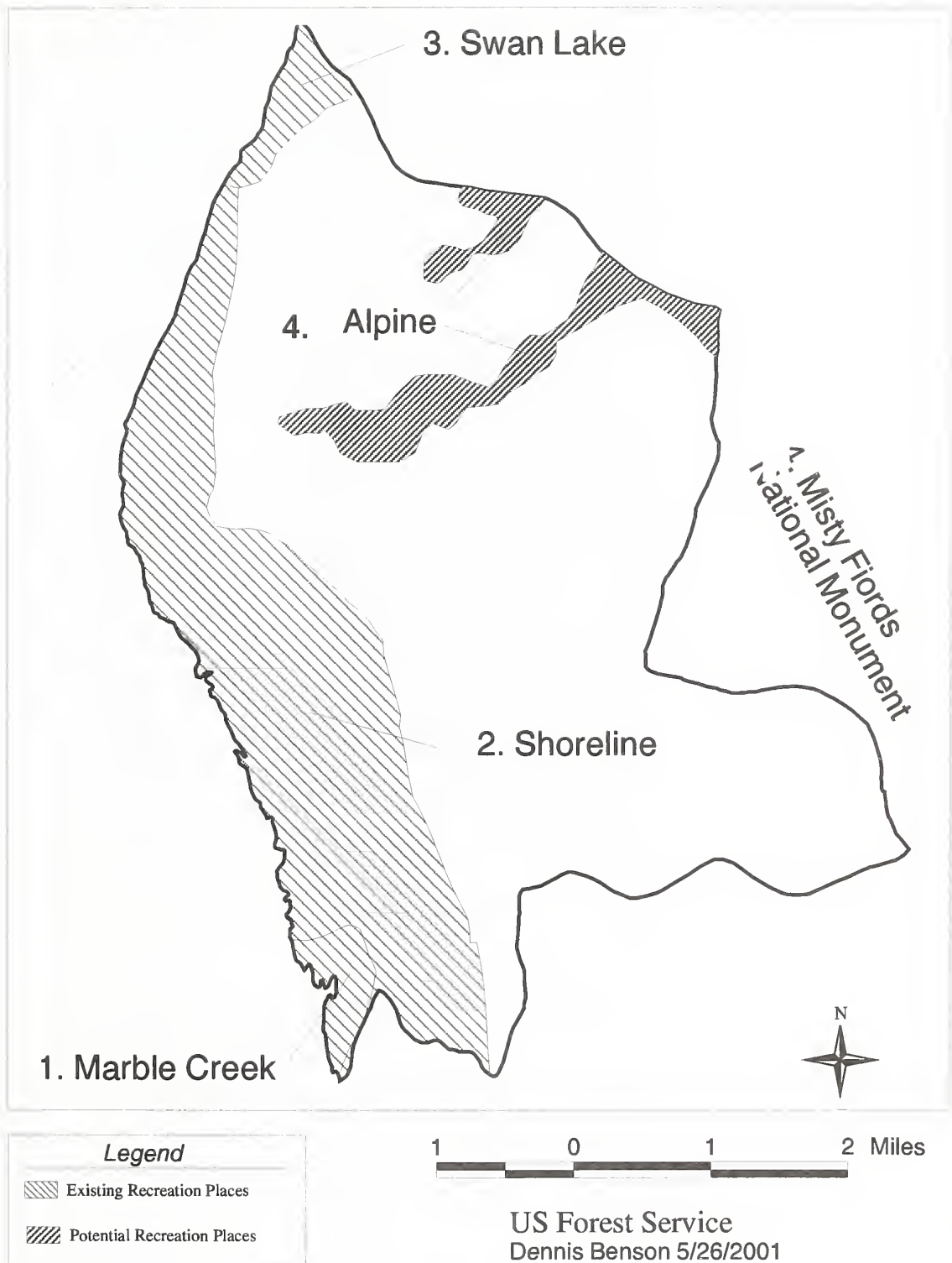
<sup>1</sup>Swan Lake is located on Carroll Inlet's east shore just north of the project area and is the site of the local power generation source for Ketchikan. The power line crosses Carroll Inlet and then travels south past Shelter Cove to beyond George Inlet.

<sup>2</sup>RN = Roaded Natural, RM = Roaded Modified, SPNM = Semi-Primitive Non-Motorized, P = Primitive

<sup>3</sup>(E) = Existing Recreation Site, (P) = Potential Recreation Site, (N/A) = Not Available

<sup>4</sup>Forest Plan Land Use Designations: TM = Timber Production, ML = Modified Landscape, OG = Old-growth Reserve  
Source: D. Benson, 2001

Figure 3-10  
Recreation Places—Existing and Potential on the Project Area



Source: D. Benson, 2001



## Environmental Consequences

### Direct and Indirect Effects

#### Alternative 1

Implementation of the No-action Alternative would leave the lands managed by the Tongass National Forest within the Licking Creek Timber Sale area in a condition similar to what they are today.

**Existing Activities and Use Patterns:** The use of the area as a place where local Ketchikan residents go for day trips and boating excursions would continue. Marine-based recreation activities would not change and the use of the road system by hunters would continue.

**ROS Classification:** Currently, 84 percent of the project area is in the Roaded Natural and Roaded Modified ROS classes. This would remain the same under this alternative. Visitors to the Licking Creek Timber Sale area would have the same experiences they are currently having.

**Recreation Places and Sites:** As for the ROS classification, existing conditions would be maintained under the No-action Alternative. Recreation places within the sale area are mostly undeveloped for recreation use.

#### Alternatives 2 & 3

**Existing Activities and Use Patterns:** The use of the area as a place where local Ketchikan residents go for day trips and boating excursions would continue. Marine-based recreation activities would not change and the use of the road system by hunters would increase slightly with the construction of new roads. About 1.5 miles of new roads (classified and temporary) would be constructed in Alternative 2, and 2.2 miles in Alternative 3. All new roads would be closed after sale activities are completed, but would allow access by foot.

**ROS Classification:** There are subtle differences between Alternatives 2 and 3 and the No-action Alternative. Most of the timber harvest would occur within the current Roaded Modified or Roaded Natural classifications. The greatest impact in these alternatives would be a reduction in the area classified as Roaded Natural (approx. 53 acres) in the northern portion of the sale area. The area classified as Roaded Modified would increase by the same amount. In an area that has undergone major modifications in the past, this is an insignificant change to the landscape. The changes to these ROS classifications would be less than 1 percent.

**Recreation Places and Sites:** Since this area has been extensively harvested, there would be very little impact to the existing conditions. Some modifications would take place along the shoreline, which has been identified as a Recreation Place. However, these modifications would be no more significant than any of the past activities. No recreation sites within this area would be affected by these alternatives.

#### Alternative 4

**Existing Activities and Use Patterns:** The use of the area as a place where local Ketchikan residents go for day trips and boating excursions would continue. Marine-based recreation activities would not change, and the use of the road system by hunters would increase slightly with the construction of new roads. About 5.5 miles of new roads (classified and temporary) would be constructed in this alternative. All new roads would be closed after sale activities are completed, but would allow access by foot.

**ROS Classification:** All of the harvesting would occur within the existing Roaded Modified classification. Effects on the current ROS classification under this alternative would be insignificant (less than 1 percent).

**Recreation Places and Sites:** Since this area has been extensively harvested, there would be very little impact to the existing conditions. Some modifications would take place along the shoreline, which has been identified as a Recreation Place. However, these modifications

would be no more significant than any of the past activities. No recreation sites within this area would be affected by this alternative.

**Alternative 5**

**Existing Activities and Use Patterns:** The use of the area as a place where local Ketchikan residents go for day trips and boating excursions would continue. Marine-based recreation activities would not change. Although this alternative harvests nearly the same units as Alternative 4, no new roads would be built. All new harvest units would be cable logged from existing roads or logged by helicopter. As in Alternative 1 (the No-action Alternative), hunters, hikers, and other recreationists would have the same network of roads available to them as they do currently.

**ROS Classification:** All of the harvesting would occur within the existing Roaded Modified classification. Effects on the current ROS classification under this alternative would be insignificant (less than 1 percent).

**Recreation Places and Sites:** Since this area has been extensively harvested, there would be very little impact to the existing conditions. Some modifications would take place along the shoreline, which has been identified as a Recreation Place. However, these modifications would be no more significant than any of the past activities. No recreation sites within this area would be affected by this alternative.

**Cumulative Effects****Alternative 1**

The project area's land use designations are Timber Production and Modified Landscape, and timber sales and road construction are expected to continue. The existing emphasis of Roaded Modified and Roaded Natural ROS classes will gradually increase over time. Existing recreation place settings will reflect this change, and new recreation opportunities associated with roads will likely be present. The planned timber sale activities (Madder and Mop Point/91 Knot) will cumulatively add to this trend.

**Alternatives 2, 3, 4, & 5**

The project area's land use designations are Timber Production and Modified Landscape, and timber sales and road construction are expected to continue. The existing emphasis of Roaded Modified and Roaded Natural ROS classes will gradually increase over time. Existing recreation place settings will reflect this change, and new recreation opportunities associated with roads will likely be present. The planned timber sale activities (Madder and Mop Point/91 Knot) and the action alternatives would cumulatively add to this trend, with Alternative 2 having the least effect and Alternative 5 the greatest.

## Roadless Area

### Background

Inventoried Roadless Areas are National Forest System lands without classified roads maintained for travel by motorized vehicles intended for highway use, do not have extensive timber harvest or other developments, and (with certain exceptions) are at least 5000 acres in area. Nationally, roadless areas have important values and characteristics that are becoming increasingly scarce as other lands are developed. Roadless areas provide places to recreate away from roads and developments, clean drinking water, undisturbed landscapes, habitat for plants, birds, fish and other wildlife, and opportunities to study natural ecosystems. Inventoried Roadless Areas were originally identified during the Roadless Area Review and Evaluation (RARE I and RARE II) studies done in the 1970s. These studies identified areas that would meet the minimum criteria for inclusion in the National Wilderness Preservation System.

In *Sierra Club v. Lyons*, the Court directed the Forest Service to prepare a supplemental environmental impact statement (SEIS) to the 1997 Forest Plan EIS to consider roadless areas within the Tongass National Forest for recommendation as wilderness. The Court later enjoined the Forest Service from timber harvest and road building in roadless areas until the SEIS is completed. The Draft SEIS was released in May 2002, and the Final SEIS and Record of Decision are scheduled to be completed in Winter 2002-2003. (See Forest Plan Draft SEIS 2002 for additional information.)

For the 1997 Forest Plan, Inventoried Roadless Areas were defined as any area more than 1200 feet from a road or 600 feet from a recently harvested unit. "Peninsulas" of roadless lands that extended into developed areas, and were considered to be heavily influenced by development, were excluded. In order to assure that all roadless lands were evaluated in conformance with the Court order, the draft 2002 Inventoried Roadless Areas map used a more refined mapping process to consistently represent unroaded areas across the Forest, and some roadless areas were expanded into areas previously mapped as developed.

The Licking Creek roadless area analysis is based on both the Roadless Inventory Map that was used in the 1997 Forest Plan revision, and the draft Inventoried Roadless Areas map (Alternative 1) prepared for the 2002 Draft SEIS. The draft 2002 inventory includes the most current land ownership information and new developments (roads, timber harvest, power lines, etc.) implemented since 1997.

No timber harvest or road construction is proposed in an inventoried roadless area under any alternative for this project. Since there are differences between the 1997 and the draft 2002 inventories for the Licking Creek project area, timber harvest and road building were planned to avoid areas mapped as roadless in either inventory.

### Affected Environment

The following technical discussion is based on the 1997 Forest Plan EIS and the Individual Roadless Area #526 description in Appendix C of the Draft SEIS (2002). We describe in detail the results of each roadless inventory in relation to the Licking Creek project area.

### North Revilla Roadless Area

The Licking Creek project area boundary encompasses a small portion of the North Revilla Inventoried Roadless Area (526). In the 1997 roadless inventory, the North Revilla Inventoried Roadless Area was estimated to be 217,818 acres. In the draft 2002 inventory, more areas were included as part of the inventoried roadless area. In addition, the north end of the project area (Licking Creek drainage) is currently roaded and was excluded from the draft 2002 inventory. In the Draft SEIS, the North Revilla Inventoried Roadless Area was estimated to be 230,679 acres (Appendix C, Forest Plan Draft SEIS 2002, p. C2-533).



The North Revilla Roadless Area is irregularly shaped, with a number of boundaries that do not follow natural topographic features. Roads and harvest units extend along a number of drainages into the roadless area, affecting the perceived naturalness of the area, as well as its boundaries. The parts of the north portion of the roadless area that adjoin the Misty Fiords National Monument Wilderness might have higher manageability as wilderness. The developed areas to the south along Carroll Inlet are not suitable for management as wilderness (Appendix C, Forest Plan Draft SEIS 2002, p. C2-541).

In 1977, the Forest Service developed the Wilderness Attribute Rating System (WARS), which was used to inventory the wilderness characteristics of roadless areas during the RARE II process. Using this system, the North Revilla roadless area was given a rating of 22 out of 28 possible points in 1989. In the Draft SEIS (2002), it was given a rating of 20. The lower rating reflects recent and ongoing developments along the margins of the roadless area. In the draft 2002 inventory, the North Revilla roadless area also included areas that in the 1997 inventory were part of the Revilla (524) and Neets (527) roadless areas (Appendix C, Forest Plan Draft SEIS 2002, p. C2-538).

Using the draft 2002 inventory as a base map, approximately 41 percent of the entire North Revilla roadless area was allocated to a LUD that allows timber harvest and road construction (Timber Production, Modified Landscape, and Scenic Viewshed) in the 1997 Forest Plan. The remainder was allocated to non-development LUDs (Appendix C, Forest Plan Draft SEIS 2002, p. C2-535). All but about 3 percent of the Licking Creek project area was allocated to Timber Production and Modified Landscape LUDs in the 1997 Forest Plan.

Approximately 3,157 acres of the Licking Creek project area were in inventoried roadless area, as mapped for the 1997 Forest Plan (Figure 3-11). The draft 2002 inventory increased the roadless area to 6,538 acres within the Licking Creek project area (Figure 3-12).

Roads were constructed within the Licking Creek drainage, and within the roadless area, under timber sale contracts sold prior to the 1997 revision of the Forest Plan. This area on the north side of the project area has been substantially altered, no longer meets the criteria of a roadless area, and was excluded in the draft 2002 inventory.

The areas that would be added to the roadless area (in the draft 2002 inventory) include the middle and lower portions of the Marble Creek and Calamity Creek drainages. The headwaters of Marble Creek and Calamity Creek border Misty Fiords National Monument and make up the southern section of the roadless area. These unroaded portions consist of steep and rugged terrain. There are no unique values to this area. The lower portions of these drainages have been roaded and harvested through past activities.

## Environmental Consequences

No harvest units or road building are proposed under any of the alternatives within the North Revilla Inventoried Roadless Area, as defined by either the 1997 or draft 2002 inventories. The proposed actions would not have any direct effects on the Inventoried Roadless Area.

However, timber cutting and road building may have an indirect effect on the roadless areas. For both the 1997 and draft 2002 inventories, a 1200-foot buffer was applied to all existing roads, and a 600-foot buffer was applied to all recently harvested units. Several of the proposed harvest units with associated roads adjoin the roadless area boundary (Figure 3-12). Depending on the criteria used to conduct a future roadless inventory, the roadless area boundary could be adjusted to reflect the new activities, and the roadless area acreage may be reduced by a small amount. This would affect no more than 320 acres (less than 1 percent) of the inventoried roadless area (as mapped in 2002) under any alternative.

## Licking Creek Project Area

## Direct, Indirect, and Cumulative Effects



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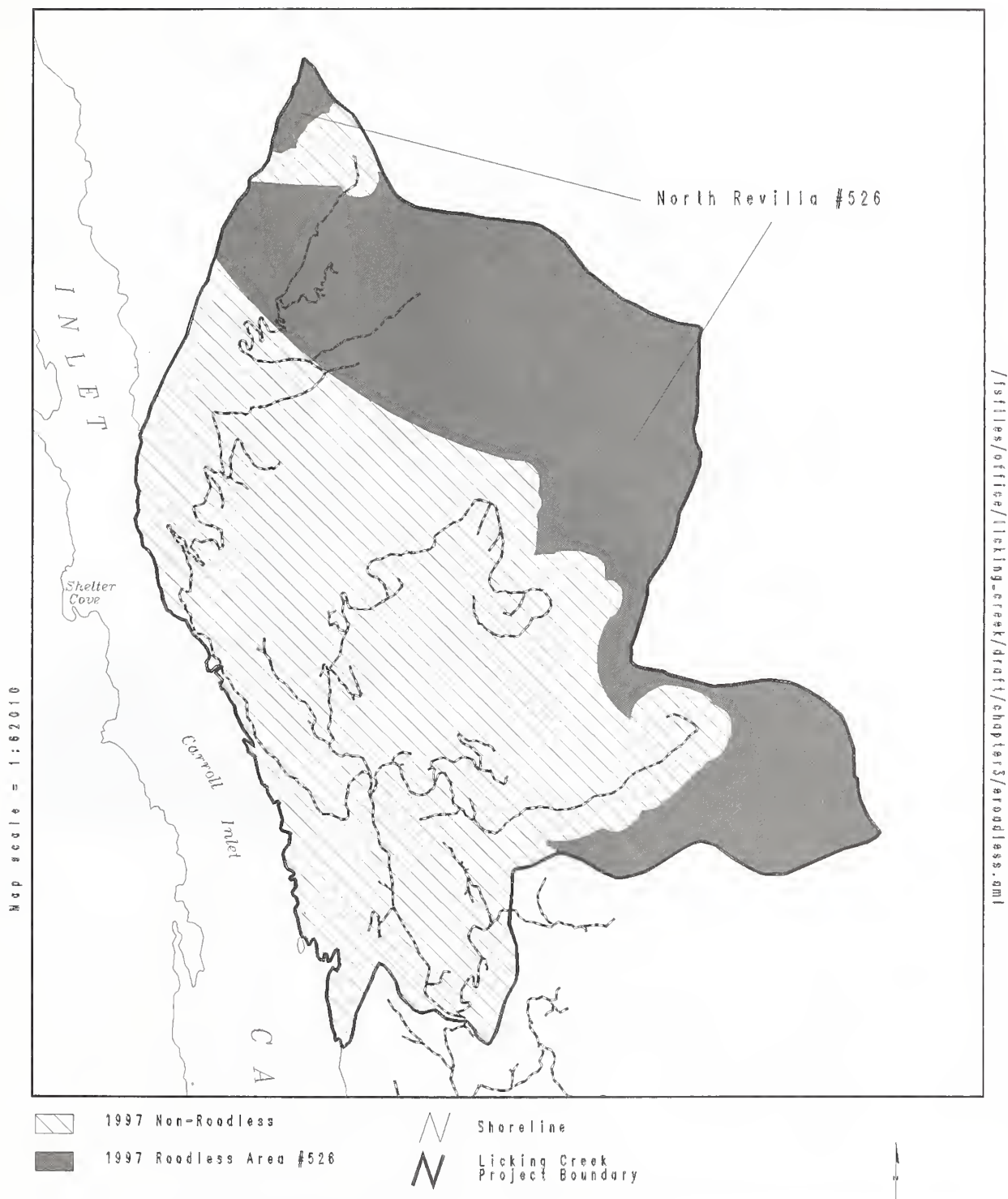
These reductions would be adjacent to developed areas, and would not impact areas with high apparent naturalness or opportunities for solitude. Due to their location and small size, this reduction would not affect the eligibility of the North Revilla Inventoried Roadless Area for wilderness designation (Appendix C, Draft SEIS 2002).

## Cumulative Effects

The Madder and Mop Point/91 Knot timber sales were not planned to harvest timber and build roads within the North Revilla Inventoried Roadless Area, as it was mapped in 1997. However, these activities are within areas that were mapped as inventoried roadless area in 2002. (The Madder sale has been sold, and the Mop Point/91 Knot sales have a signed NEPA decision but have not yet been sold. The Forest Service is currently enjoined from permitting timber harvest and road building in roadless areas until 45 days after publication of the Forest Plan Final SEIS.) The activities are located near Carroll Inlet, the western boundary of the project area (Figure 3-12). Depending upon the final configuration of the roadless area, these sales may reduce the inventoried roadless area by 366 acres. Cumulatively, these sales and the Licking Creek alternatives would affect no more than 686 acres (less than 1 percent) of the roadless area under any alternative.

These reductions would be adjacent to developed areas, and would not impact areas with high apparent naturalness or opportunities for solitude. Due to their location and small size, this cumulative reduction would not affect the eligibility of the North Revilla Inventoried Roadless Area for wilderness designation (Appendix C, Draft SEIS 2002).

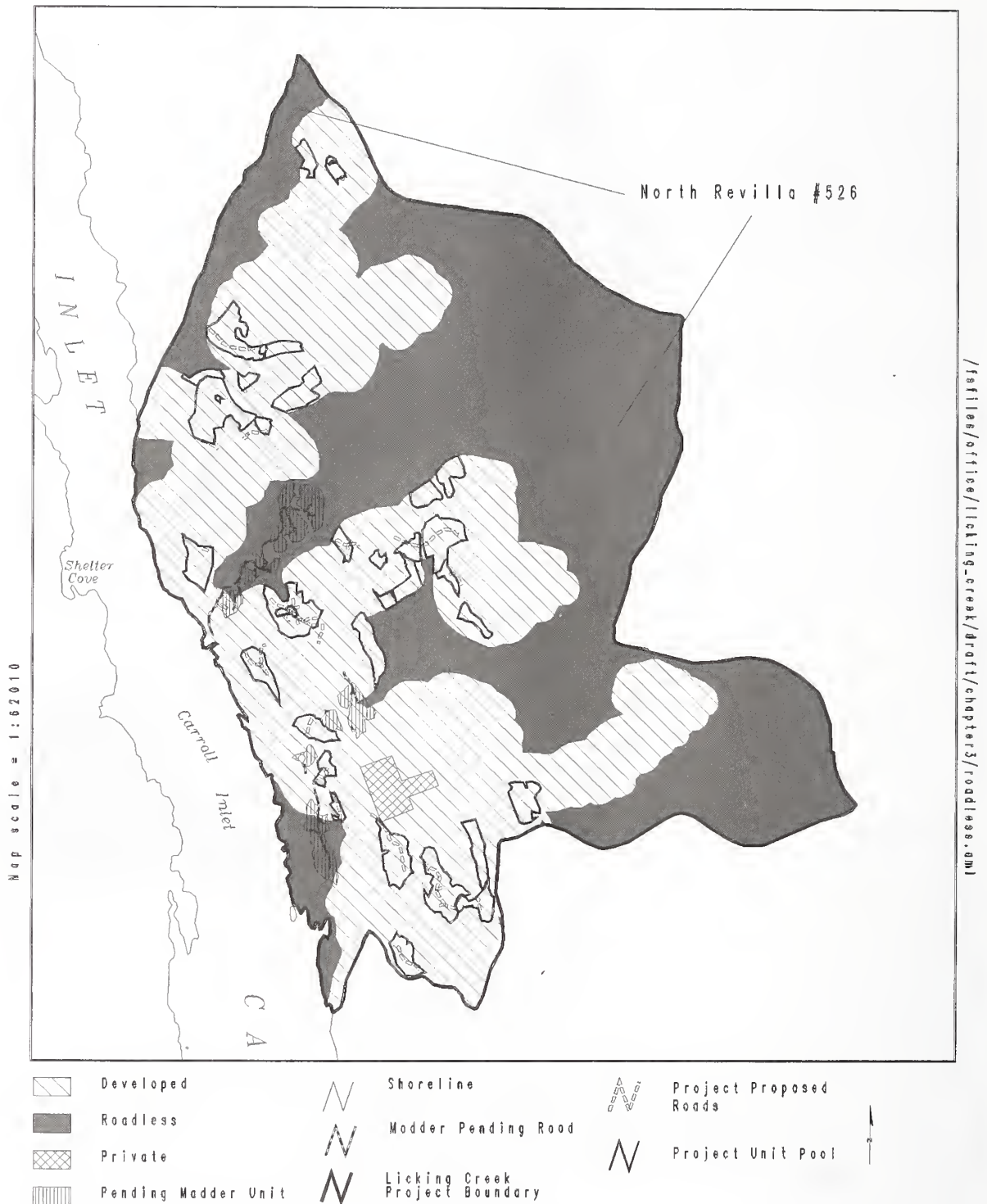
Figure 3-11  
1997 Inventoried Roadless Area and Existing Roads on the Project Area



Source: J. Llanos, 2002

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Figure 3-12  
2002 Inventoried Roadless Area and Proposed Units and Roads on the Project Area



Source: J. Llanos, 2002

## Scenery

This analysis is summarized from the Scenic resource report for the Licking Creek project area. This report is tiered to the Forest Plan Final EIS, Chapter 3 and Forest Plan, Chapters 3 and 4 and Appendix F. In addition to the text given below, several visual simulations are illustrated in Appendix C (Figures C-2 through C-15).

## Affected Environment

### Landscape Character of the Project Area

The Licking Creek project area is viewed primarily from Carroll Inlet, a long narrow fiord that extends from Revillagigedo Channel, near the mouth of George Inlet, into the interior of Revillagigedo Island. Carroll Inlet is primarily used by local residents, who boat up the fiord to fish for crab and shrimp and to hunt along much of the shoreline. Carroll Inlet is the one Visual Priority Travel Route identified in the Forest Plan for this project area.

The landscape around the project area consists of a series of blocky ridges dissected by several winding and twisting drainages. The ridge summits are broad and rounded, and generally start about 2 miles back from the shore of Carroll Inlet. They range from about 2,000 feet to almost 3,000 ft. at the back of the various drainages. The valleys between these ridges are generally U-shaped. The landscape along the shoreline of Carroll Inlet is characterized by low, rolling to almost flat terrain, except for a long, steep 1,000-foot ridge that rises from the saltwater just south of the mouth of Licking Creek. This landscape is fairly typical of most of Carroll Inlet and nearby Thorne Arm and George Inlet. Just north of the project area, the mountain terrain becomes higher, steeper and more rugged.

The scenic quality of a project area landscape is partly based on the diversity of landform, vegetation, water features and rock forms it exhibits relative to the much larger landscape character type in which it is located. This project area is part of the Coastal Hills character type. This is one of five broad geographic regions in Southeast Alaska described in the National Forest's original visual management system that serve as frames of reference for inventorying scenic quality. The National Forest scenic management system rates landscapes as Class A (distinctive landscape diversity), Class B (common degrees of diversity), or Class C (very low degree of diversity). Because the scenic diversity within the Licking Creek project area landscape is similar to that of most of the Coastal Hills character type, the Forest's scenery resource inventory rates it as a Variety Class B.

### Project Area Viewpoints

To analyze the scenic impacts of a proposed timber sale, we identify the recreation use areas, travel routes and residential and urban areas from which the project may be viewed (viewsheds), and then describe the landscapes seen from these areas. As noted above, Carroll Inlet is the primary recreational use area in the vicinity of this project.

Three viewpoints along Carroll Inlet, adjacent to the project area, were chosen for this analysis. These are Viewpoint 1, just north of the mouth of Licking Creek; Viewpoint 2, just opposite the mouth of Calamity Creek; and Viewpoint 3, just north of the mouth of Marble Creek (see Figure C-1 in Appendix C). Viewpoint 2 consists of two separate viewing angles: 2a, looking to the northeast, generally up the Calamity Creek valley; and 2b, a view just to the south of the Calamity Creek valley. Viewpoint 3 also consists of two separate viewing angles: 3a, a view to the northeast toward the major ridge between Marble Creek and Calamity Creek; and 3b, a view to the east toward a long, low ridge south of Marble Creek.

### Existing Visual Condition From These Viewpoints

Extensive harvest has occurred throughout much of this project area and has been spread throughout each of the past 4 decades. A few scattered spots along the shore were harvested in the late 1950s to early 1960s, and currently are vegetated with thick, dark green second growth



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(Viewpoints 1 and 2a, Fig. C-2 & C-4, Appendix C). Extensive harvest occurred in the 1970s on the slopes just back from the shore between Calamity Creek and Marble Creek, and further up the Marble Creek drainage. These harvest areas have greened up, but not to the extent of the 1960s harvest (Viewpoints 2b and 3a, Fig. C-7 & C-10, Appendix C). Additional harvest took place in these drainages in the 1980s. In the early- to mid-1990s several units were harvested on the ridges and slopes between Licking Creek and its southern tributary. Much of this harvest is hidden by intervening landforms, except for a couple of units on the upper southeastern slopes above Licking Creek (the left side of Viewpoint 1, Fig. C-2, Appendix C).

The combination of the larger-scale older harvest and the more recent harvest areas scattered throughout this viewshed results in a moderately to heavily altered scenic condition from many viewpoints. This level of impact is found primarily in the middleground portion of the viewshed. This zone consists of the slopes and ridges roughly between 1/2 and 5 miles from the viewing positions. (See the zones labeled “mg” on the map in Fig. C-1). Viewpoint 1 is an example of a more moderate level of impact that is created by the ridge-top units mentioned above. These units, though large, tend to blend well with the terrain (Fig. C-2). The landscape seen from Viewpoint 3a is more heavily altered due to the large-scale older harvest to the left of the view, and the large blocky more recent harvest to the right of the view (Fig. C-10). The landscape viewed from Viewpoint 3b is moderately altered (Fig. C-13, Appendix C).

The foreground portion of the viewshed is in this case the area between the shoreline and the ridgeline that follows the first set of knolls and ridges just back from the shore. (See the zone labeled “fg” on the map in Fig. C-1). This part of the viewshed is, for most part, only slightly altered. Most of the impacts in this foreground zone are from older units that have substantially regenerated since they were logged about 40 years ago (Fig. C-2 and C-4, Appendix C).

#### Visual Quality Objectives

The Forest Plan expresses the desired condition for National Forest System lands in terms of visual quality objectives (VQOs). These describe the amount of alteration, when looking across a landscape, for which we are to manage. VQOs are linked to the land use designations (LUDs - see Chapter 1). These VQOs are applied to the landscapes viewed from Visual Priority Travel Routes and Use Areas, which are identified in the Forest Plan. Carroll Inlet is the one Visual Priority Travel Route in the Licking Creek project area. The Forest Plan assigned the following VQOs for the Licking Creek area:

- **Maximum Modification:** management activities may dominate the characteristic landscape, but will at the same time use naturally established form, line, color and texture. They should appear as natural occurrences when viewed from over 5 miles away.
- **Modification:** management activities may dominate the characteristic landscape, however, they must borrow from natural form, line color, and texture so completely and at such a scale that the visual characteristics of the activity are those of natural features of the surrounding area.
- **Partial Retention:** management activities may be evident but are subordinate to the characteristic landscape.

In upper Carroll Inlet, the Forest Plan allocates the foreground to the Modified Landscape LUD. Hence, the VQO within the foreground zone is Partial Retention (see map in Fig. C-1). Much of the foreground viewshed meets the Partial Retention objectives, since the only alterations to the natural landscape character include a few scattered 40-year-old heavily regenerated units that are starting to blend into the remaining landscape. (See Figs. C-2 and C-4, Appendix C).

Most of the middleground viewshed in this project area is allocated to Timber Production. The VQO for these areas is Maximum Modification. The one exception is the middleground ridge seen between Calamity and Marble Creeks, which is allocated to Modified Landscape. The VQO in this portion of the viewshed is Modification. This portion of the landscape meets the

standards for a Modification VQO from most viewpoints. From Viewpoint 3a in optimum afternoon lighting conditions, the impacts on this ridge appear somewhat greater, due to the greater visibility of the blocky unit to the right of the view that was cut in the mid 1980s, but still meets the Modification VQO. In the remaining middleground portions of the Carroll Inlet viewshed, past harvest activities at least meet the standards for the Forest Plan adopted VQO of Maximum Modification VQO, and from many viewpoints meet a Modification VQO (Fig. C-2, C-5, C-8, and C-14, Appendix C).

## Environmental Consequences

### Direct and Indirect Effects

The following section describes the effects that the action alternatives would have on the scenic condition of the above viewsheds. We based this assessment on the design measures and harvest treatments prescribed for certain critical units. Appendix C includes visual photo simulations from five viewpoints (Figures C-2 through C-15). The locations of these viewpoints are shown on the map accompanying these photos (Figure C-1, Appendix C). These simulations display what the proposed harvest may look like for these particular units. On the ground, factors such as topography, slope, streams and location of reserve trees may cause the actual harvest units to look slightly different from the simulations.

#### Alternative 1 (No Action)

If this alternative were selected, no additional visual impacts would be created between Licking Creek and Marble Creek. Existing past harvest areas would continue to regenerate to a point where recently harvested units would begin to green up, and older harvested areas would continue to establish more of a forested texture. In about 20 years, the portion of the viewshed from Calamity Creek to just north of Marble Creek (seen most clearly from Viewpoint 3a, C-10), would be close to meeting a Partial Modification VQO. The landscapes north of Calamity Creek would generally reach a Partial Retention VQO, since the ridgetop units harvested in the 1990s would have enough texture so that they would not dominate the landscape (Viewpoint 1, Fig. C-2).

#### Alternative 2

Under this alternative, very few units would be harvested that would increase the scenery impacts in the viewshed between Licking Creek and south of Marble Creek. At the north end of the project area viewshed, the upper portion of Unit 12 would be visible from Viewpoint 1. North and south of this viewpoint, Unit 12 would disappear from view. The impact of this one new unit and the existing harvest on the ridges to the north would meet a Modification VQO. At the south end of the viewshed, the east half of Unit 63 would be seen from Viewpoint 2b (Fig. C-9). The impact of this unit and the existing harvest would meet a Modification VQO.

#### Alternative 3

At the north end of the project area, portions of units 9, 10, and 12 would be visible from Viewpoint 1. The impacts of Unit 10 would be mitigated by a large retention area on the east slopes above the stream cutting through the western side of the unit. This retention is intended to protect some karst features. This retention and the adjacent stream buffer would create a peninsula of trees that would break up the scale of this unit (see Fig. C-3). The combined impacts of units 9, 10 and 12 and the recently harvested areas would meet the Forest Plan VQO of Maximum Modification.

In the middle portion of the viewshed, two units (40 and 63) would be partially visible from Viewpoints 2b and 3a. Unit 40 would harvest the top of a ridge directly facing these viewpoints (Figure C-9 and Figure C-12, Appendix C). This unit would be visible as a narrow band of harvested ground along the top of the ridge, which would be somewhat screened by reserved areas in the southern portion of the unit and scattered retained trees in other portions of the unit. Unit 40 would be slightly more visible from Viewpoint 3a than 2b, and would add slightly to impacts created by the existing harvest. However, from most of the viewpoints

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between 2b and 3a, the impact of this unit and the regenerating second growth would be consistent with the Forest Plan VQO of Modification. As in Alternative 2, a portion of Unit 63 would also be visible from Viewpoint 2b. The impact of Unit 63 in combination with the older harvest would easily meet the Maximum Modification VQO that applies to the rest of the middleground viewshed.

No additional impacts to the view from Viewpoint 3b would be created by this alternative.

#### **Alternative 4 (Proposed Action)**

In this alternative, impacts in the north part of the viewshed (Viewpoint 1) would be slightly less than in Alternative 3 by omitting Unit 12. Units 9 and 10 would be harvested with the same prescription as described for Alternative 3.

In the middle part of the viewshed (seen from Viewpoints 2a, 2b, and 3a), the impacts would be slightly greater than those described for Alternative 3. This alternative adds two units, 19 and 44, on the foreground slopes on either side of the mouth of Calamity Creek. Only a small portion of Unit 44 (on top of a knob) would be visible. Impacts from Unit 19 would be mitigated by partial-cut harvest of the steep slopes facing south and southwest. Only the northwest corner of the unit, just below an existing road, would be clearcut. The overall impact of Units 44 and 19, along with the well-established texture in the old harvest areas just above the shore, would meet the guidelines for the Forest Plan VQO of Partial Retention for the foreground portion of the viewshed (Viewpoint 2a, Fig. C-6, and Viewpoint 2b, Fig. C-9).

This alternative includes Unit 40, described above under Alternative 3 (Viewpoint 3a, Fig. C-12). In addition to Unit 40, this alternative adds two middleground units, 43 and 50, which would be seen from Viewpoints 2a or 3a. Unit 43 encompasses a pair of small knobs. This unit configuration reduces the amount of clearcut edges that would be visible, softening to a degree the impact of the unit. (It would be visible at the right side of Viewpoint 2a and the left side of Viewpoint 3a.) A portion of Unit 50, as well as Units 40 and 43, would be visible from Viewpoint 3a. All three of these units would add a moderate amount of impact to that created by the existing harvest. However, from most viewpoints, the impact of this harvest would be consistent with a Modification VQO adopted for the ridge between Calamity and Marble Creeks (Fig. C-12).

In the southern part of this project area, this alternative adds two units on an elongated landform that extends south of the Marble Creek drainage. Unit 67 faces Carroll Inlet, and would be bisected by an extra-wide riparian buffer on the stream running through the unit. Some scattered clumps of trees, retained to meet Marten Standards and Guidelines, may also soften the impact of the unit. Unit 71 straddles the top of the landform and would be hidden from view, except for the south-southwest corner, which lies on the gentle west-facing slopes. A corridor of old growth lies between these two units. This harvest in combination with the existing harvest on the top of this low ridge would be consistent with the standards for the Maximum Modification VQO assigned to this Timber Production area (Fig. C-15).

#### **Alternative 5**

This alternative is very similar to Alternative 4 with the following exceptions:

- This alternative does not include Unit 43 that would be visible from Viewpoints 2a and 3a, and the impacts would be slightly less from these viewpoints.
- This alternative includes both Units 10 and 12, which would be visible from Viewpoint 1. Therefore, the impact from this viewpoint would be identical to Alternative 3 and slightly greater than in Alternative 4, but well within the guidelines for the Maximum Modification VQO.



Table 3-28  
Summary of Units Visible from Viewpoints

Viewpoint	Unit Number by Alternative				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
1	0	12	9, 10, 12	9, 10	9, 10, 12
2a	0	0	22, 24	19, 24, 43	19
2b	0	63	40, 63	40, 44, 63, 67, 71	40, 44, 63, 67, 71
3a	0	0	40	40, 43, 50	40, 50
3b	0	0	0	67, 71	67, 71

Source: J. Short, 2001

## Cumulative Effects

### Alternative 1 (No Action)

In addition to the present visual condition created by past timber harvest within the project area, there will be additional impacts created by a series of Madder timber sale units that have been sold but not yet logged. These will add slight impacts to the landscape seen from Viewpoints 2a, 2b, 3b, and moderate impacts to the landscape seen from Viewpoint 3a. In Viewpoint 2a, a pair of small units just above Calamity Creek will expose some harvest ground on two small knobs in the middle of the view (Fig. C-5). In Viewpoint 3a, a long clearcut at the base of a blocky ridge will be clearly visible between the old harvest and the more recent rectangular unit at the right of the view (Fig. C-11). The view from this viewpoint will not quite meet the Modification VQO, due to the addition of the large Madder unit to the existing harvest. This unit is also slightly visible from Viewpoint 2b (Fig. C-8). A long narrow Madder unit will appear as a sliver of exposed harvested ground at the base of the slope seen in Viewpoint 3b (Fig. C-14).

Assuming the Madder units are cut, in about 10 years these units will be fully greened up, as will the recently harvested units at the north end of the project area. The older harvest areas will have additional forested texture established in them. Most of the project area will be in a slightly altered condition, except for the ridge between Calamity and Marble Creek, which will be in a moderately altered condition.

No impacts to scenery are anticipated from the Mop Point/91 Knot and, as it will involve one small (less than 10 acre) unit from the existing road system.

### Alternative 2

At the north end of the viewshed, the landscape seen from Viewpoint 1 will not be impacted by any Madder units. Proposed Unit 12 is the only additional impact that would be seen from this viewpoint. From Viewpoint 2b, a small portion of one Madder unit will be seen in combination with Unit 63, which sits on a slope further to the south. The cumulative impact of this unit, the Madder unit, and the existing harvest would meet a Modification VQO.

### Alternative 3

The combined impacts of Units 9, 10 and 12 and the recently harvested areas would meet the Forest Plan VQO of Maximum Modification.

In the central part of the project area viewshed, Unit 40 would be visible from Viewpoint 2b in combination with a very small portion of one Madder unit at the base of a slope below Unit 40. This same Madder unit will be highly visible from Viewpoint 3a, where Unit 40 would also be seen with it. From most of these viewpoints, the cumulative impact of the existing harvest,



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these Licking units, and the Madder units would be consistent with the Forest Plan VQO of Modification. From Viewpoint 3b, no proposed units would add to the impacts.

## **Alternative 4 (Proposed Action)**

The overall impact of Units 44 and 19, along with the well-established texture in the old harvest areas just above the shore, would meet the guidelines for the Forest Plan VQO of Partial Retention for the foreground portion of the viewshed (Viewpoint 2a, Fig. C-6, and Viewpoint 2b, Fig. C-9). From Viewpoint 2a, the cluster of Madder units in the middleground will be seen in combination with Unit 43. From Viewpoint 3a, Units 50, 40 and 43 would add slightly to the impacts created by the existing harvest and the long Madder unit. From most of the Carroll Inlet boat route in the central portion of the project area, the cumulative impacts of the existing harvest, the proposed Licking units and the Madder units would meet the middleground Modification VQO (Fig. C-6 and C-9).

In the southern part of this project area, the combined impacts of Units 67 and 71, the regenerating second-growth on adjacent lands and the long narrow Madder unit below Units 67 and 71 would be consistent with the guidelines for the Forest Plan VQO of Maximum Modification that applies to this portion of the middleground viewshed (Viewpoint 3b, Fig. C-15).

## **Alternative 5**

The cumulative impacts at the northern end of the project area (Viewpoint 1) would be the same as for Alternative 3, while cumulative impacts throughout the rest of the project area would be the same as for Alternative 4, except that Unit 43 is not included in this alternative.

**For all action alternatives**, about 10 years after harvest, all harvest units, the Madder units (assuming they are harvested soon), and the rest of the most recent harvest would have greened up and reduced the visual contrast to a point that would bring most of the project area to a moderately altered condition. In 30-40 years, all the recently harvested areas would have regained enough forested texture so that much of the project area would be brought to a slightly altered condition. Within another 20 to 30 years, the area would return to a near-natural visual condition.

## Silviculture and Timber Management

Silviculture is the science of managing forest vegetation, primarily through the application of timber harvest prescriptions. The Biodiversity and Old Growth section of this chapter discusses aspects of old-growth forest not related to forest products. Additional background on forest land classification, silviculture, logging systems, and other topics may be found in the Forest Plan (Chapter 3, "Timber" and Appendix G) and in the Licking Creek resource reports for silviculture and timber management.

### Affected Environment

#### Forest Vegetation

The natural vegetation of the Licking Creek project area is a mixture of coniferous forest interspersed with muskeg (bog), shrubland and riparian plant communities. The Forest Service has developed a regional plant association guide to classify different forest types. This classification helps to provide an inventory of resources and serves as a management guide. The project area contains all seven forested vegetation series that are commonly found throughout southern Southeast Alaska. These vegetation series are grouped by the dominant overstory species and are as follows: Sitka spruce, western hemlock, mountain hemlock, western hemlock-yellow cedar, western hemlock-western red cedar, mixed conifer and shore pine series. These vegetation series are further divided into plant associations, which include the understory vegetation.

Table 3-29 shows the dominant plant associations for forested land identified in the project area unit pool, in order of frequency found in percentage of project area unit pool.

Table 3-29  
Plant Associations and Abundance in the Licking Creek Project Area Unit Pool

Plant Association	Plant Association #	Coverage in Project Area Unit Pool (%)
Western Hemlock/Blueberry/Devil's Club	100140	19
Mixed Conifer/Blueberry /Deer Cabbage	400430	11
Western Hemlock/Blueberry/Skunk Cabbage	100130	9
Mountain Hemlock/Blueberry	500510	8
Western Hemlock/Blueberry	100110	7
Mixed Conifer/Blueberry/Skunk Cabbage	400420	7
Western Hemlock/Blueberry/Shield Fern	100120	5
Mixed Conifer/Blueberry	400410	4
Western Hemlock-Western Red Cedar/Blueberry/Skunk Cabbage	700730	4
Other plant associations found in minor abundance		36

Source: Stand exam data: 2000, 2001

The forested lands in the project area are a mixture of mature, unharvested stands and second growth following previous timber harvest or recent natural disturbances. All stands proposed for harvest are mature and beyond the age of maximum average annual growth of the stand. Most are representative of uneven-aged western hemlock, cedar and spruce stands that commonly need over 100 years to develop under natural conditions.

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## Forest Health and Natural Disturbance

### Wind Disturbance

Wind is the major disturbing influence within the project area. Overall, however, windthrow has been minor to moderate throughout the project area, with the heaviest occurrences along the edges of previously harvested units.

Stands occurring on wind-exposed slopes, especially those with a southern exposure, seem to have frequent storm intervals that restrict forest development to the first three stages of development: stand initiation, stem exclusion, and understory reinitiation. By contrast, the final stage of stand development, old growth, usually occurs in wind-sheltered areas on the north-facing slopes of ridges and mountains, since the dominant strongest winds come from the south.

On the wind-exposed, south-facing slopes, the most common progression of stand development starts with partial disturbance, with most of the trees blowing down and leaving varying numbers of legacy trees (residual trees following a blowdown event). Over time, seedlings invade the openings created by the wind event. Due to the frequency of the storms, the stand becomes partially disturbed again. Many stands never develop more than three ages classes, as the oldest age class continually blows over in major storm events.

On the protected north-facing slopes, where there is relatively infrequent disturbance, individual trees senesce (mature) and die. These individual trees create gaps in the canopy where seedlings will invade. Other single trees in the stand will senesce, die and create still more gaps in the canopy with seedlings filling the open gap in the canopy. This is called gap-phase dynamics. This eventually leads to true old-growth conditions.

Clearcuts mimic natural processes and are prescribed in topographic locations that are most susceptible to recurring, large-scale wind disturbance, such as the south/southeast facing slopes, ridge noses, and hilltops. In these locations, and adjacent to previously harvested stands, the edges of the residual stand are more susceptible to wind damage. Steps, such as feathering unit edges or modifying the unit shape, can be taken to minimize the windthrow potential. Uneven-aged management is most successfully prescribed in wind-protected landscapes, where small-scale, gap-phase dynamics naturally occur (Nowacki and Kramer 1998).

### Dwarf Mistletoe

Dwarf mistletoe reduces the vigor and growth rate of hemlock and often produces a low quality of timber. Cankorous swellings often occur at the point of infection on limbs and main stems. These cankers offer an entrance for wood-destroying fungi, which can lead to heart rot. The occurrence of dwarf mistletoe within the project area varies widely. Mistletoe infections are minor to moderate in most areas, affecting one-third to two-thirds of the hemlock within the stands. More severe infections occur in small, scattered areas within the project area, but have not been widespread.

Dwarf mistletoe progresses relatively slowly in Southeast Alaska; however, with stands which are partially harvested, there may be some infected trees. The infected trees should be removed if the desired future condition is to eliminate infected trees in the residual stand and to prevent the spread of mistletoe to the regenerated stand.

Trees infected with mistletoe may have some inherent value to certain wildlife species. In some instances, it may be beneficial to retain severely infected trees to maintain and/or provide wildlife habitat.

### Alaska Yellow Cedar Decline

Alaska yellow cedar decline is an occurrence that causes considerable mortality in Southeast Alaska. Mortality can be in small patches or can cover expansive areas. Affected trees may die more quickly (2 or 3 years), or more slowly over a 15-year or longer period with crowns progressively thinning. The cause of Alaska yellow cedar decline is not completely understood. The disease is generally associated with boggy conditions, usually near muskegs.

The primary cause of mortality is unknown, and no single factor has been shown to be primarily responsible for tree death (Hennon et al., 1990).

The Licking Creek project area has some occurrence of cedar decline, especially in lower-volume, less-productive sites. The disease appears to be affecting scattered, small patches, rather than affecting large, expansive areas. The proposed harvest units that do have cedar decline may have the Alaska yellow cedar salvaged from the stands. There may be some problems in adequately restocking those stands with Alaska yellow cedar; however, the decline has little or no direct influence on regeneration of other species.

## Decay Fungi

There is evidence of decay fungi throughout the study area. These populations of fungi cause timber volume loss, and impact growth and yield. Many decay fungi enter through tree wounds.

Stands of trees that are healthy and in a balanced mix of age classes, from very young to harvestable age, are a key part of the desired condition for managed forested lands. The Forest Plan provides a classification scheme that identifies the amount of forested lands that are capable of, and available for, timber production.

*Non-forested land* is not capable of timber production, and includes areas of bare rock, alpine meadows, muskeg wetlands, and soils that only support scrub timber.

*Commercial forest land* is land that can produce 20 cubic feet of tree growth annually, and/or must contain at least 8,000 board feet of net timber volume per acre.

*Suitable forest land* is land that is physically suitable for timber harvest, can be adequately restocked in 5 years, and has been identified in the Forest Plan as within a land use designation that has timber available for timber management. In addition, Forest Plan Standards and Guidelines identify areas that are excluded from timber harvest to meet other resource concerns. These include beach fringe, wildlife nest or den buffers, stream buffers, and land on slopes greater than 72 percent with unstable soils. After these exclusions, the remaining lands are considered suitable and available for timber harvest.

The following land use designations within the Licking Creek project area are potentially suitable for timber harvest: Timber Production (11,389 acres) and Modified Landscape (2,779 acres). Of these lands, 5,530 acres (39 percent) were classified as unsuitable or unavailable for timber management, either through application of Standards and Guidelines (riparian areas and beach fringe), or soils and slope criteria.

Table 3-30  
Forest Land Classification Acres

Project Area NFS Land <sup>1</sup>	Non-Forested Land	Non-commercial Forested Land	Commercial Forested Land	Suitable and Available Forest Land
14,321	1,381	3,511	9,429	3,899

<sup>1</sup>Does not include ponds or other ownerships (non-National Forest System land) within the project area  
Source: GIS, Tongass NF

The Logging System Transportation Analysis completed for the Licking Creek project area identified approximately 1,278 acres of potential harvest units. However, the GIS database is not refined enough to show small inclusions of unsuitable land within suitable stands. During unit layout, additional acres may be identified as being unsuitable for timber harvest. These are areas not capable of producing sufficient volume or not harvestable using existing technology, and unmapped streams requiring additional riparian buffers. A list of the units that were

## Forest Land Classification



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## Volume Classification

excluded from consideration for harvest, with the rationale for excluding them, is in the project planning record.

Historically, forested lands in the Tongass National Forest were classified by volume class. The Forest Plan adopted a volume strata classification system, which replaced the volume classes, during the revision of the Forest Plan. Volume strata include hydric soils and slope information, as measures of productivity and growth rate. The following strata were defined by combining volume class data with hydric soil classification:

High Volume Strata - Areas within timber inventory volume classes 5, 6, and 7 on non-hydric soils, and on hydric soils with slopes greater than 55 percent.

Medium Volume Strata - Areas within timber inventory volume classes 5, 6, and 7 on hydric soils with slopes less than or equal to 55 percent; areas within timber inventory volume class 4 that are either on non-hydric soils, or are on hydric soils greater than 55 percent.

Low Volume Strata - Areas within timber inventory volume class 4 that are on hydric soils with slopes less than or equal to 55 percent.

Table 3-31 displays number of suitable acres within each strata for the Licking Creek project area.

Table 3-31  
Available Suitable Acres by Strata

Strata	Suitable Acres
Low	417
Medium	594
High	2,888

Source: Stand exam and cruise data for the Licking Creek project area.

### Past Harvest

Past harvest in VCU 7460 was initiated in the middle to late 1950s, and was concentrated along the beach on either side of Carroll Inlet. To date, 4,576 acres have been harvested within the VCU, of which 2,954 acres have been harvested within the Licking Creek project area boundaries. (For existing conditions, see the map for Alternative 1 - No Action in Chapter 2.)

All 2,954 acres were clearcut harvested and are being managed as even-aged stands. The first harvest in the project area first began in 1954. Between 1954 and 1962, harvest occurred in single units, generally along the beach fringe, employing an A-frame logging method. A total of 284 acres were harvested during this time. Significant harvest began in this area in the early 1970s. Between the years of 1972 and 1974, 1,330 acres were harvested (103 of those acres were harvested on private land). Subsequent entries were made in 1980 (47 acres), 1987-1990 (756 acres), 1993-1994 (480 acres) and 1996 (57 acres).

Most harvested stands regenerate naturally with the species that existed on the site before harvest. In stands where desirable species (Alaska yellow cedar, western red cedar or Sitka spruce) may not regenerate to their original levels, the harvest units are planted to ensure their establishment.

All stands within the project area have successfully regenerated. In eight of the harvested units, 120 acres were planted. These plantings were prescribed as a way to manipulate species composition and were not necessary to certify the stands as reforested as required by the National Forest Management Act (NFMA).

Precommercial thinning opens up stands with closed canopies to more light, allowing understory vegetation to persist longer. It can speed up stand development to reach later seral

stages sooner, diversify the stand structure, and encourage a desired species mix in the regenerated stand. Diameter growth is faster, yielding stands with merchantable timber in less time than if left alone. Precommercial thinning can change the structure in young stands to meet a number of objectives for wildlife habitat, riparian function, and timber production.

In the project area, 725 acres have been precommercially thinned. In 85 of the thinned acres, canopy gaps were created to benefit wildlife. The remaining second growth in the project area was harvested either in the mid-1970s and is too old for optimum thinning, or was harvested in the early 1990s and will not be ready for thinning for another 2-5 years. Many of these older stands are in the beach buffer or in areas now designated as old growth and may no longer be managed for timber production. These stands, however, may be considered for thinning to improve wildlife old-growth habitat, and will be evaluated during monitoring.

## Environmental Consequences

### Timber Harvest

Proposed timber harvest for the Licking Creek project occurs on that portion of National Forest System land that is suitable and available for timber harvest. Suitable and available timberlands are forested lands that exclude:

- slopes greater than 72 percent (excluded unless the District Ranger approves harvest on slopes of 72 percent or greater on a case-by-case basis, based on the results of an on-site analysis of slope and Class IV channel stability, and an assessment of potential impacts of accelerated erosion on downslope and downstream habitat, other beneficial uses of water, and other resources),
- riparian habitat buffers,
- LUDs inappropriate for timber production, i.e., Old-growth Reserves,
- beach buffers,
- eagle buffers, and
- second growth which would not be available until the next rotation.

No timber harvest is proposed under Alternative 1 (No Action). Under the action alternatives, the acres that would be converted from mature forest to a managed condition range from 253 acres under Alternative 2 to 790 acres under Alternative 4 (Table 3-32). All proposed harvest units are within the Modified Landscape and Timber Production LUDs.

Table 3-32  
Effects of Alternatives 2, 3, 4 and 5 on the Available Suitable Timber Base in the Licking Creek Project Area

	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Available Suitable Timber</b>				
Acres	3,899	3,899	3,899	3,899
Volume (CCF)	212,865	212,865	212,865	212,865
<b>Planned Harvest</b>				
Acres	253	573	790	765
Percent of Available Suitable by Acres	6.5	14.7	20.3	19.6
<b>Planned Volume</b>				
Volume (CCF)	10,709	23,832	33,556	32,261
Percent of Available Suitable by Volume	5.0	11.2	15.8	15.2

Source: D. Fletcher, 2002

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#### Proposed Harvest by Volume Strata

The proposed harvest of available suitable acres within each volume strata, in the Licking Creek project area, is displayed in Table 3-33. The proposed harvest of low strata acres is 0.4 percent for all action alternatives, and varies by alternative from 6 percent to 22 percent of the medium and high strata acres.

Table 3-33  
Proposed Harvest of Available Suitable Acres by Strata

Strata	Alt. 2	Alt. 3	Alt. 4	Alt. 5
No Volume Class	30	48	96	72
Low	2	2	2	2
Medium	35	69	130	90
High	186	454	562	601

Source: J. Llanos, GIS, 2002

#### Volume Class and Coarse Canopy Stands

There is much interest as to the extent and location of coarse canopy stands, particularly when analyzing wildlife habitat. We are currently verifying the accuracy of Couette's model for use in identifying those stands. Until that assessment is complete, general consensus from interagency biologists recognize that timber volume classes 6 and 7 are an adequate predictor of coarse canopy stands. Characteristics of these stands include relatively low stem densities, large diameters, and a coarse-textured canopy when viewed from the air. There are currently 367 acres of volume class 6, of which 232 are suitable available acres and 0 acres of volume class 7 within the project area (Table 3-34).

Table 3-34  
Volume Class by Acre for the Licking Creek Project Area

Volume Class (acres harvested) <sup>1/</sup>	Available Project Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
	Acres					
Vol. Class 4	290	0	5	17	42	39
Vol. Class 5	3,025	0	184	404	558	569
Vol. Class 6	232	0	34	104	94	85
Vol. Class 7	0	0	0	0	0	0
Other (no volume class)	7,853	0	30	48	96	72
<b>Total</b>	<b>11,400</b>	<b>0</b>	<b>253</b>	<b>573</b>	<b>790</b>	<b>765</b>

<sup>1/</sup> Volume Class displayed for information purposes only; volume classes 6 and 7 currently used as the best indicator of coarse canopy stands (see Wildlife section in Chapter 3).

Source: J. Llanos, GIS, 2002

The percentage of volume proposed for harvest, by species, is consistent between alternatives, averaging 21 percent spruce, 70 percent hemlock, 8 percent Alaska yellow cedar and 2 percent Western red cedar for all harvest units within the project area.

#### Silvicultural Systems

The term "silvicultural system" refers to a planned process whereby a stand is harvested, re-established and tended to achieve a desired condition. The system name is based on the number of age classes present after the initial harvest, such as even-aged, two-aged and uneven-aged systems. (For a detailed discussion of silvicultural systems and methods, see the Forest Plan Final EIS, Appendix G. Criteria for the selection of harvest methods and silvicultural systems are also presented in the National Forest Management Act implementing regulations (36 CFR 219.27)).

*Even-aged systems* produce stands that consist of trees of the same or nearly the same age. A stand is considered even-aged if the range in tree ages normally does not exceed 20 percent of the age at which the stand is to be harvested (the "rotation age"). Seed tree cutting, shelterwood cutting, and clearcutting produce even-aged stands.

*Uneven-aged systems* create stands that include three or more distinctly different age classes. Uneven-aged conditions are created through management by using individual tree or group selection methods.

*Two-aged systems* utilize treatments that leave behind a substantial portion of the original stand structure, in the form of large trees distributed or clumped throughout the stand area. The remnant trees left on the site represent one "age class" and the newly established trees represent another age class. No two-aged system treatment is prescribed for this project and this system will not be discussed further.

Even-aged systems more closely mimic the natural conditions of the large-scale disturbance ecologies (for instance, areas subject to windthrow and landslides), while uneven-aged systems more closely mimic gap-dominated old-growth ecosystems (where large-scale disturbance is not a major factor). Both disturbance types are prevalent throughout Southeast Alaska.

The selection of the appropriate silvicultural system is dependent upon the feasibility of achieving sound silvicultural objectives. These can include objectives for species composition, stand density, growth rates, insect and disease control, and overstory development. The Forest Plan and issues raised by the public and resource managers are used to refine site-specific objectives. It is important to distinguish scale when visualizing harvest treatments for individual units or stands. For instance, while the ideal condition may be to apply a treatment uniformly over an entire harvest unit, this is often not possible due to terrain, logging systems capabilities, and vegetative conditions.

The action alternatives contain mostly even-aged silvicultural systems with a small portion of uneven-aged systems (Table 3-35). The proposed harvest units range from 7 acres to 93 acres in size. The site-specific silvicultural prescriptions are listed in the unit cards (Appendix B).

**Table 3-35**  
**Prescribed Silvicultural System by Alternative in Percent of Acres**

<b>Silvicultural System</b>	<b>Alternative 1 (% acres)</b>	<b>Alternative 2 (% acres)</b>	<b>Alternative 3 (% acres)</b>	<b>Alternative 4 (% acres)</b>	<b>Alternative 5 (% acres)</b>
Even-aged	0	100%	96%	99%	96%
Uneven-aged	0	0	4%	1%	4%
<b>Total Acres:</b>	<b>0</b>	<b>253</b>	<b>573</b>	<b>790</b>	<b>765</b>

Source: Sheila Spores, 2002

## Silvicultural Prescriptions

Prescriptions are documented descriptions of activities needed to implement the silvicultural treatment, or treatment sequence to move a stand towards a desired silvicultural system. The following harvest treatments are examples of some prescriptions selected for use in the Licking Creek project area.

Should one of the action alternatives be selected, these prescriptions would be applied to specified units to achieve the following desired stand conditions in the Licking Creek project area.

### Even-aged Prescriptions

Even-aged clearcut with reserves (EACCR): Most merchantable trees would be harvested. The objective is to create a fast-growing stand of trees to maximize wood fiber production. Some trees would be left standing, either clumped or singly, to create future stand diversity and



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to provide for structure to meet Marten Standards and Guidelines in areas of high-value marten habitat. The stand would regenerate into a mostly single-aged stand. Where this treatment is recommended, it has been determined that it is optimal for the site and the created openings would not exceed 100 acres, to be in compliance with the National Forest Management Act.

## Uneven-aged Prescriptions

Uneven-aged management techniques include removing individual trees, groups of trees, and a fixed percentage of basal area in a stand. Stands proposed for an uneven-aged system in this project would have approximately 50 percent of the basal area removed this entry. The remaining 50 percent of the basal area would be removed over two more entries, each of these entries removing approximately 25 percent of the basal area, for a total of three entries. The resulting stands would mimic many of the characteristics of stands that develop in areas where small-scale blowdown predominates. Rotation lengths are likely to be about 150 years under these systems, and there would be some reduction in fiber production as compared to even-aged systems (like clearcuts), which commonly have rotation lengths of about 100 years in the Licking Creek project area.

The treated stands would have a high level of structural diversity, as enough of the overstory would be removed to allow younger trees to grow and seedlings to become established. Shade-tolerant species, such as western hemlock and cedar, would be favored, although spruce would grow in the larger openings.

Group Selection (GS): Trees would be removed in small patches and/or strips, with the widths of the openings generally not exceeding approximately twice the height of mature trees in the stand. Trees infected with dwarf mistletoe would be targeted for removal to avoid infection for the regeneration. Groups with windfirm characteristics would be a high priority to leave. Each harvested opening would regenerate, creating a patch of trees with a uniform age and height. These openings may be thinned. This would maintain or create a stand of three or more distinct size classes in small groups, resulting in an uneven-aged stand. The appearance of the residual stand mimics natural blowdown patches.

Single Tree Selection (STS): Trees would be removed singly and dispersed evenly throughout the stand. Trees would be selected for removal using a criterion such as species, diameter limits, or spacing. A range of diameters, or everything above or below a certain diameter limit, may define the trees selected for harvest. The resulting stand may have small openings plus individual trees harvested throughout the stand. Removing trees throughout the stand would retain a continuous large tree canopy following harvest and still manage the stand for timber production. This would maintain or create three or more distinct size classes distributed throughout the stand. The residual stand would have structural diversity that would provide wildlife habitat and maintain scenic quality. Marten Standards and Guidelines would be met in high-value marten habitat.

## Logging Systems

Yarding is the process of transporting logs from the stump to the landing. This can be done using ground-based equipment, cable logging systems, or helicopters. The method prescribed depends upon many factors, including access, topography, slope, and resource protection needs.

All proposed logging systems are in conformance with national and regional standards and guidelines. Logging systems were assigned to the harvest units through interdisciplinary analysis to minimize potential effects; special logging requirements are specified on the unit cards (Appendix B). We inspect the harvest units during the planning and layout process to ensure that the management objectives for resource protection are met.

Economics is also an important factor in choosing the yarding method. The most economical logging systems currently in use are cable and shovel yarding. The most expensive is helicopter logging.

## Ground-based Yarding

Moist, soft soil conditions in conjunction with steep slopes found in the project area limit the use of ground-based equipment operation. Approximately 3 to 13 percent of the proposed harvest acres could be shovel yarded with track-mounted log loaders, depending on alternative (Table 3-36). Road rights-of-way are particularly suitable for shovel yarding.

## Cable Yarding

Cable yarding systems are the most common logging systems used throughout Southeast Alaska. Cable systems have the capability to partially or fully suspend logs over the ground, reducing soil disturbance. These systems are best suited to even-aged silvicultural prescriptions. When trees are retained to meet other resource concerns, the economic efficiency declines. Table 3-36 displays the amount of cable system by alternative.

## Helicopter Yarding

With this system, logs are lifted off the ground (fully suspended) and flown to a landing or barge. This yarding system causes the least amount of ground disturbance of all the systems, and usually has the highest yarding cost. Consequently, the economic feasibility of helicopter logging is more closely affected by timber market values than the other types. Helicopter logging was considered in all of the action alternatives (Table 3-36).

**Table 3-36**  
**Proposed Logging Systems for the Licking Creek Timber Sale**

Logging System	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Cable</b>				
Acres <sup>1/</sup>	102	235	425	155
Volume (CCF)	5,293	12,537	22,964	8,421
<b>Shovel</b>				
Acres <sup>1/</sup>	7	14	84	12
Volume (CCF)	303	711	4,392	642
<b>Helicopter</b>				
Acres <sup>1/</sup>	94	194	114	430
Volume (CCF)	5,113	10,584	6,200	23,198

<sup>1/</sup>Acres reflect unit acres reduced for martin habitat, soils, stream buffers and visual deferrals, therefore total acres actually logged by alternative will be less than unit acres by alternative shown elsewhere in the document.

Source: D. Fletcher, 2002

## Post-harvest Effects

We expect that all harvested areas would naturally regenerate and be certified as fully stocked after three full growing seasons. Approximately 38,270 acres have been harvested on the Ketchikan-Misty Fiords Ranger District between 1954-2001. Monitoring of previous harvest units on this District shows a 100 percent regeneration success rate. Regeneration (stocking) surveys would be conducted on all harvest units after the third full growing season following the completion of logging.

After reforestation, managed forests grow through several successional stages, in which different components dominate the stand and forest structure changes over time. All harvest alternatives would move the project area toward the Forest Plan desired condition of a balanced mix of stand structures and ages across the landscape.

Precommercial thinning would be performed approximately 15-20 years after harvest, based on site, stocking, and other resource needs. This treatment reduces competition for sunlight, moisture, and nutrients, allowing the understory plants and remaining conifers to grow at accelerated rates for a longer time than in unthinned stands. It can also be used to change

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species composition and windfirmness of the stand. Some acres would not be thinned due to steep terrain, inaccessibility, and safety considerations.

## Long-term Timber Productivity (Yield)

All stands proposed for harvest are mature, uneven-aged, and beyond the age of maximum average annual growth of the stand. Harvest increases forest floor temperatures, which speeds up organic decomposition and increases the supply of available nutrients to the trees. The effects of all action alternatives on long-term yield would be the conversion of unmanaged, slow-growing, mature stands to managed, faster-growing, multi-aged or even-aged stands.

The open conditions created by even-aged harvest systems allow Sitka spruce, western red cedar, Alaska yellow cedar and western hemlock to regenerate rapidly. The spruce and cedar components can be increased by selectively thinning the hemlock, in an attempt to maintain the original species composition. The composition of the uneven-aged stands proposed in the Licking Creek project area is expected to be similar overall to the original composition. Over the course of several cutting cycles, however, the mix may vary.

## Direct and Indirect Effects

Timber harvest would affect the structure of the forest. Clearcut harvest management would create primarily second-growth stands with or without older residual trees. Uneven-aged harvest would create stands with a variable stand and age structure, depending on the site-specific prescriptions. Forest health concerns, including the removal of trees with disease or that face imminent mortality, could be used as factors in determining which trees to harvest.

### Alternative 1

Vegetation and forest health would not be affected. Tree growth and mortality would continue to progress at the same rate as present. Forest lands located elsewhere would need to be harvested to meet market demands for timber.

### Alternative 2

This alternative harvests the least amount of acres. In this alternative, 253 acres would be converted to managed stands, all of which would be managed as even aged. Thirty-four acres would be clearcut harvested with only unmerchantable trees left remaining where operationally feasible. Seven acres would have a seed tree harvest applied, where approximately 5 percent of the basal area would be retained in desirable crop trees to provide a seed source to aid in regeneration of certain species. In the remaining 212 acres of even-aged stands, reserve trees would be left, either scattered and/or clumped throughout the unit, in areas of high-value marten habitat to retain some of the old-growth characteristics of the forest.

Forest health and productivity would be improved by the removal of dwarf mistletoe-infected trees and by creating younger, faster-growing forests.

### Alternative 3

This alternative would convert 573 acres of old-growth forest to a managed condition. Of these acres, 96 percent would be managed as even-aged forest. Thirty-four acres would be clearcut harvested with only unmerchantable trees left remaining where operationally feasible. Seven acres would have a seed tree harvest applied, where approximately 5 percent of the basal area would be retained in desirable crop trees to provide a seed source to aid in regeneration of certain species. In the remaining 510 acres of even-aged stands, reserve trees would be left, either scattered and/or clumped throughout the unit, in areas of high-value marten habitat to retain some of the old-growth characteristics of the forest. Twenty-two acres would be managed as uneven-aged forest. Trees would be removed, either singly throughout the entire unit or removed in small patches and/or strips, to retain approximately 50 percent of the trees. This would create a mosaic of old-growth forest with regeneration in the openings.

Forest health and productivity would be improved by the removal of dwarf mistletoe-infected trees and by creating younger, faster-growing forests.



## Alternative 4

This alternative would have the greatest effect on vegetation in the Licking Creek project area. About 790 acres would be converted to managed stands. Of these acres, 99 percent would be managed as even-aged forest. Fifty-three acres would be clearcut harvested with only unmerchantable trees left remaining where operationally feasible. In the remaining 731 acres of even-aged stands, reserve trees would be left, either scattered and/or clumped throughout the unit, in areas of high-value marten habitat to retain some of the old-growth characteristics of the forest. Six acres would be managed as uneven-aged forests. Trees would be removed, either singly throughout the entire unit or removed in small patches and/or strips, to retain approximately 50 percent of the trees. This would create a mosaic of old-growth forest with regeneration in the openings.

Forest health and productivity would be improved by the removal of dwarf mistletoe-infected trees and by creating younger, faster-growing forests.

## Alternative 5

This alternative would convert 765 acres of old-growth forest to a managed condition. Of these acres, 96 percent would be managed as even-aged forest. Sixty-two acres would be clearcut harvested with only unmerchantable trees left remaining where operationally feasible. In the remaining 675 acres of even-aged stands, reserve trees would be left, either scattered and/or clumped throughout the unit, in areas of high-value marten habitat to retain some of the old-growth characteristics of the forest. Twenty-eight acres would be managed as uneven-aged forest. Trees would be removed, either singly throughout the entire unit or removed in small patches and/or strips, to retain approximately 50 percent of the trees. This would create a mosaic of old-growth forest with regeneration in the openings.

Forest health and productivity would be improved by the removal of dwarf mistletoe-infected trees and by creating younger, faster-growing forests.

Access to units in this alternative would be greatly limited due to no road construction. This would lead to a greater expense in reforestation work and would possibly limit or prohibit pre-commercial thinning opportunities in the future.

## Cumulative Effects

Long-term sustainability is the ability of an area to provide a supply of wood fiber over the long term. Timber harvest in the Licking Creek Timber Sale would have a direct effect on the project area's long-term sustainability. For planning purposes, all suitable lands within the project area are potentially available for harvest throughout the rotation. The rotation for this area is approximately 100 years, but varies with site-specific conditions. This means that, over the rotation, all forest stands determined to be suitable for commercial timber production would be managed for their desired condition.

Past harvesting has resulted in the conversion of 2,954 acres from old-growth forest to second-growth forest within the project area. Although some of these acres are no longer in the timber base due to changes in standards and guidelines (i.e. 1,000' beach buffer), much of the second growth is on forested land within the suitable timber base. The Forest Plan has designated management of this suitable timber for the reasonably foreseeable future. Forest-wide, existing second growth has been scheduled as part of the timber supply. Thinning of second growth or conversion to uneven-aged management may occur. All of the proposed harvest units that have an uneven-aged management prescription have subsequent entries planned. The current 10-year timber sale schedule also includes one 9-acre unit of blowdown, as part of the Mop Point/91 Knot Timber Sales, within the Licking Creek project area.

Table 3-37 displays the cumulative effects of timber harvest on the suitable timber base in the project area for the reasonably foreseeable future. Alternative 1 would not contribute to the harvest of the suitable timber base. Stands selected for harvest in Alternatives 2 through 4 for the Licking Creek Timber Sale would be managed on a 100-year rotation. Future harvest entries scheduled in the project area would depend heavily on the volume remaining within the



### 3 Environment and Effects

suitable and available timber base, which would range from 202,156 CCF after implementation of Alternative 2 to 179,309 CCF after Alternative 4 (Table 3-37).

Table 3-37  
Cumulative Effects to the Available Suitable Timber Base in the Project Area

Timber Sale Project	Suitable and Available Acres Pre-Harvest	Suitable Timber Base Harvested (acres)	Cumulative Change to Suitable Timber Base (percent)
Madder and Mop Point/91 Knot Timber Sales	4,148	258	6.2%
Licking Creek Alt. 2 + above sales	3,899	511 (253 plus 258)	12.3%
Licking Creek Alt. 3 + above sales	3,899	831 (573 plus 258)	20.0%
Licking Creek Alt. 4 + above sales	3,899	1,048 (790 plus 258)	25.3%
Licking Creek Alt. 5 + above sales	3,899	1,023 (765 plus 258)	24.7%

Source: D. Fletcher, 2002

## Soils

This section reviews the existing information on the Licking Creek project area for management of soils, including mass wasting, erosion, and soil productivity. Information from the Forest Service's GIS database, and field surveys of the project area were used. A Forest-wide treatment of soils may be found in the Forest Plan Final EIS, Chapter 3, and the Forest Plan, Chapter 4 and Appendix C. The unit and road cards (Appendix B) contain additional site-specific mitigation for implementation.

## Affected Environment

Soil development in Southeast Alaska is influenced by high levels of rainfall, cool maritime temperatures, and moderately low annual soil temperatures. Under these conditions, organic material decomposes slowly, resulting in thick surface layers of organic soil. Windthrow, flooding, and landslides are important types of natural disturbance that alter the soil properties. In general, parent material, topography, vegetation, animals, and climate influence soil features that affect and are affected by timber harvest activities. Soils influence vegetation composition, water quality, riparian areas, and wetland values, and the productivity of timber and fish, and indirectly affect wildlife in the Licking Creek project area.

### Mass Movement Erosion

Mass wasting events, also called landslides, are the naturally occurring dominant process of erosion in Southeast Alaska. Landslides can deliver soil, rock, and debris to the aquatic environment. They are most likely to occur on steep valley sideslopes and within V-notches (Swanston, 1969; Swanston, 1991). V-notches (steep, deeply incised streams) are located throughout the project area.

Landslides may occur during or immediately after periods of heavy rainfall, when soils are saturated (Swanston, 1970). Landslides usually occur on steep slopes that have soils with distinct subsurface layers such as compact glacial till or bedrock that slopes parallel to the ground surface. These parallel subsurface layers form a smooth slip-plane on which slides occur (Flaccus, 1959, cited in Bishop and Stevens, 1964).

The Forest Service uses a Mass Movement Index (MMI) to identify potentially unstable sites in a project area. The MMI summarizes the physical properties of a soil, and rates the relative stability of the soil into one of four classes of landslide potential: 1 (low), 2 (medium), 3 (high), and 4 (very high). Most mineral soils that occur on slopes greater than 72 percent gradient, and some mineral soils with restricted drainage on slopes greater than 60 percent gradient, are classified as MMI 4.

Table 3-38  
Mass Movement Index High (MMI3) and Very High (MMI4) Classes and Slopes Greater than 72% in the Project Area by Watershed (Acres)<sup>1</sup>

	Acres of Slopes Greater than 72%	Acres of MMI 1	Acres of MMI 2	Acres of MMI 3	Acres of MMI 4
Project Area Acres	2,294	3,071	4,788	7,031	2,995

<sup>1</sup>Some of the acres listed here are outside of the project area, as some of the watershed boundaries extend beyond the project area. (Refer to Figure 3-4, Watershed map, under Water Quality and Fish Habitat.)

<sup>2</sup>Note that there is some overlap in acres of slopes greater than 72% with MMI3 and MMI4 soils. In other words, some acres of MMI3 and MMI4 soils are also counted in the slopes greater than 72% category.

Source: J. Llanos, GIS, 2001

## Soil Loss

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Potential harvest units with some indicator of soil instability are being field reviewed by a soil scientist. In some cases, the soil scientist identified slopes greater than 72 percent that are suitable for timber harvest due to lower-than-MM1 4 landslide potential. This analysis is ongoing, and specific areas will be identified for each unit in the final unit cards.

## Surface Erosion

Management can cause surface erosion, a process not typically found in the natural environment in Southeast Alaska since thick organic surface layers and vegetation roots help protect mineral soil from erosion. When the organic surface layer is removed, however, the mineral soils are exposed, and erosion can occur. The rate of erosion depends primarily on the amount and type of vegetation, erodibility of the soil, and the steepness of slope.

Management activities can increase surface erosion through disturbance of the protective organic mat. Surface organic layers can be removed by yarding activities, exposing underlying mineral soils to overland flow. Road cuts can intercept the shallow subsurface flow along a hillside and concentrate runoff into ditch lines, which can then erode the road surface and deliver sediment to streams at crossings. This process can also increase the effective drainage network as road ditches intercept runoff and form new channels.

In the project area, existing roads needing repair are a potential source of surface erosion. Sediment-plugged culverts become sediment sources when stream flow is strong enough to remove the culvert and associated sediment. Cutbank erosion and slumping are also potential sediment sources. Sections of road needing reconstruction are listed in the road cards (Appendix B), and road conditions are discussed further under Transportation (Chapter 3).

## Environmental Consequences

### Direct and Indirect Effects

#### Effects on Soil Productivity

Soil productivity is defined as the capacity of the soil to produce plant growth, due to the soil's inherent chemical, physical, and biological properties.

Road construction and rock pit development remove forest soils from timber production. To mitigate negative impacts caused by landing construction and location, BMP 13.10, Log Landing Location and Design, would be used to design and construct landings to minimize soil erosion and water quality degradation (FSH 2509.22).

Soil and water resource protection measures would be incorporated into the design of roads (BMP 14.3, FSH 2509.22). For all alternatives involving the construction of roads, the total loss of soil productivity equals the area covered by new roads (Table 3-39). We assumed 2.9 acres of disturbance per mile of road and 1 acre of disturbance for each proposed rock pit within the project area. About half of the needed rock pits already exist on the project area. We assumed  $\frac{1}{4}$  acre of disturbance per pit for further development.

**Table 3-39**  
**Potential Soil Disturbance from Road and Rock Pit Construction in the Licking Creek Project Area**

<b>Proposed Activity</b>	<b>Alt. 1</b>	<b>Alt. 2</b>	<b>Alt. 3</b>	<b>Alt. 4</b>	<b>Alt. 5</b>
Acres of disturbance from road construction <sup>1</sup>	0 acres	3.71 acres	5.37 acres	12.04 acres	0 acres
Acres of disturbance from rock pit development <sup>2</sup>	0 acres	0.64 acre	1 acre	2 acres	0 acres
<b>Total Disturbance</b>	<b>0 acres</b>	<b>4.35 acres</b>	<b>6.37 acres</b>	<b>14.04 acres</b>	<b>0 acres</b>

<sup>1</sup>Assumes 2.9 acres of disturbance per mile of road constructed.

<sup>2</sup>Assumes 0.5 acres of disturbance per mile of road constructed.

Source: P. Frohne, 2001

Alternative 4 proposes the most road development of the alternatives; if implemented, Alternative 4 would result in the greatest loss of long-term soil productivity. Alternative 3 proposes less road development than Alternative 4, Alternative 2 proposes less development than Alternatives 3 and 4, and Alternative 5 proposes no new road development.

Soil displacement within harvest units can have detrimental impacts to soil productivity. Soil disturbances are areas where felling of trees or yarding of logs has impacted the surface organic mat. Small soil disturbances are not considered detrimental, but disturbances larger than 100 square feet are referred to as "soil displacements" and are considered detrimental to soil productivity (Region 10 Soil Quality Standards).

### **Effects on Surface Erosion**

While surface erosion is not a pervasive problem in the project area, sediment can be delivered to streams at road crossings. Short-term effects are associated with road construction activity, and long-term effects are produced by the erosion of road surfaces and cut-and-fill slopes.

Sediment transport from road construction activities would be minimized with erosion control measures and BMPs. Long-term erosion of the road prism and associated cut-and-fill slopes would be addressed by post-construction BMPs, which include revegetation, road maintenance, and decommissioning of roads (pulling culverts and reseeding the road bed).

Stream crossings increase the amount of sediment delivered to a stream over natural conditions. This effect would be minimized with BMPs such as Bridge and Culvert Design and Installation (BMP 14.17) and the Control of In-channel Operations (BMP 14.14) (FSH 2509.22). Crossing structures would be designed to pass extreme flow events that could plug culverts and result in failure of the crossings.

The number of stream crossings differs among the action alternatives. (See the Watershed and Fisheries section in this chapter.)

### **Effects on Mass Movement Erosion**

Timber harvest can induce slumping in the sidewalls of V-notches through the removal of protective vegetation. This effect would be minimized by applying no-harvest buffers to (at a minimum) the topographic slope break above Class III streams and by using harvest systems that yard the timber away from streams.

Vegetation, particularly tree roots, has a stabilizing effect on slopes. Maximum loss of rooting strength occurs 3 to 5 years after a tree is cut, resulting in a reduction in soil shear strength (Swanston and Walkotten, 1969). This reduction of soil shear strength results in an increased likelihood of landslides on steep slopes following clearcutting. Effects of partial cutting on slope stability in Southeast Alaska are largely unknown. Under natural conditions, windthrow



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is an important triggering device of landslides in Southeast Alaska. Research in Southeast Alaska has suggested that, although less than 10 percent of all landslides in the past 20 years were related to logging or roads, these activities may increase the potential for landslides in a given area (Swanston, 1991).

Landslides are most likely to occur when timber is harvested or roads are constructed on landscapes with very high mass movement indices (MMI 4). Landslides are less likely on areas with a lower MMI rating (MMI 1-3). A minor degree of site disturbance is unavoidable under any timber harvest activity. Table 3-40 displays the acres or miles of project activities located in potential high-risk sites.

**Table 3-40**  
**Proposed Roads and Timber Harvest Activities in Sites at High Risk for Soil Erosion**

<b>Proposed Activity</b>	<b>Alt. 1</b>	<b>Alt. 2</b>	<b>Alt. 3</b>	<b>Alt. 4</b>	<b>Alt. 5</b>
Acres of disturbance associated with roads on MMI 4 soils	0	0.04	0.04	0	0
Acres of timber harvest on MMI 4 soils	0	9.3	54.6	24.9	54.6
Acres of harvest on slopes exceeding 72 percent	0	34.4	70.5	60.1	76.3
Percent of harvest on slopes exceeding 72 percent	0	13.6%	9.6%	7.6%	7.2%
<b>Total High-risk Acres in Project Area<sup>1/</sup></b>	<b>0</b>	<b>43.7</b>	<b>125.1</b>	<b>85.0</b>	<b>130.9</b>

<sup>1/</sup> Since there is some overlap in MMI 4 soils and slopes exceeding 72%, the number reported here is most likely an overestimation of high-risk acres.

Source: P. Frohne, 2001

Results in this Draft EIS for slopes exceeding 72 percent (Table 3-40 and unit cards, Appendix B) were based on the Forest Plan. In most harvest units, the slopes exceeding 72 percent are short pitches adjacent to cliffs or rock outcrops, and do not present an actual risk for mass movement.

#### Effects by Alternative

##### **Alternative 1**

No additional sediment sources or transport pathways would be created. However, existing sources would continue to produce minor amounts of sediment.

##### **Alternative 2**

The direct and indirect effects of Alternative 2 pose the fourth-highest risk to soil resources. Proposed activities would occur on about 44 acres of high-risk sites (Table 3-40). While timber felling and yarding would result in ground disturbance, the use of BMPs and no-disturbance buffers would minimize sediment delivery from harvest units to the stream system.

##### **Alternative 3**

The direct and indirect effects of Alternative 3 pose the second-highest risk to soil resources. Proposed activities would occur on about 125 acres of high-risk sites (Table 3-40). While timber felling and yarding would result in ground disturbance, the use of BMPs and no-disturbance buffers would minimize sediment delivery from harvest units to the stream system.

##### **Alternative 4**

The direct and indirect effects of Alternative 4 pose the third-highest risk to soil resources. Proposed activities would occur on about 85 acres of high-risk sites (Table 3-40). While timber felling and yarding would result in ground disturbance, the use of BMPs and no-disturbance buffers would minimize sediment delivery from harvest units to the stream system.

## **Alternative 5**

The direct and indirect effects of Alternative 5 pose the highest risk to soil resources. Proposed activities would occur on about 131 acres of high-risk sites (Table 3-40). While timber felling and yarding would result in ground disturbance, the use of BMPs and no-disturbance buffers would minimize sediment delivery from harvest units to the stream system.

## **Cumulative Effects**

The soil scientist used photo interpretation and ground reconnaissance to evaluate potential effects of the action alternatives. Best Management Practices (BMPs) are intended to minimize surface erosion and mass wasting. Soil protection mitigation measures and BMPs are listed on the unit and road cards. Past harvest on private lands has shown that the impacts of landslides tend to be isolated to chutes or steeper sidewall slopes where the activities originated. These areas typically contain steeper gradient non-system streams or Class IV streams. All alternatives meet Standards and Guidelines and the Forest-wide strategy for soil protection.

Within the Licking Creek project area, 2,954 acres have been harvested to date, with 264 acres occurring on slopes greater than 72 percent. Currently, 249 acres are scheduled for harvest within the project area as part of the Madder Timber Sale, of which 3.8 acres are on slopes greater than 72 percent. No slopes greater than 72 percent are located within the 9-acre Mop Pt./91 Knot Timber Sale unit. Action alternatives for the Licking Creek project include harvest between 34 and 76 acres on slopes greater than 72 percent. In the reasonably foreseeable future, between 3,000 and 3,602 total acres are tentatively suitable and available for harvest (see Silviculture and Timber Management, Table 3-37). All projects must conform to Forest Plan Standards and Guidelines.

## Subsistence

The following discussions and analyses are based on the detailed subsistence information and analyses contained in the Subsistence and Communities sections, Chapter 3, Appendix H the Forest Plan Final EIS. Federal management of fisheries resources in navigable streams commenced on October 1, 1999. Federal management of subsistence resources other than fish commenced on July 1, 1990. The Watershed and Fisheries and Wildlife sections of this chapter contain additional analyses of habitats and populations of fish, deer, and other wildlife species. The identification, protection, and interpretation of cultural and historic resources are addressed by the National Historic Preservation Act, and are discussed in the Heritage section of this chapter.

## Affected Environment

### Subsistence and ANILCA

Subsistence is a broad term applied to the use by rural Alaskans of many natural resources. In the Alaska National Interest Lands Conservation Act (ANILCA, 16 USC 3113) of 1980, subsistence is defined, in part, as “the customary and traditional uses by rural Alaskan residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation” (ANILCA Sec. 803). The Act provides for the continuation of these uses “consistent with sound management principles and the conservation of healthy populations of fish and wildlife” (ANILCA Sec. 802). It also states, in part, under Section 804 that “...the taking on public lands of fish and wildlife for non-wasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes.” For many rural Alaskans, subsistence is a way of life that embodies deep cultural and religious meaning.

ANILCA requires that Federal agencies with jurisdiction over public lands in Alaska analyze subsistence resources and their uses and evaluate potential effects of management activities on these resources and uses (ANILCA Sec. 810). This analysis typically focuses on food-related resources that are most likely to be affected by habitat loss or alteration associated with land management activities. The analysis usually addresses three factors related to subsistence uses: 1) resource distribution and abundance, 2) access to resources, and 3) competition for the use of resources. The evaluation determines whether subsistence uses within the project area or portions thereof may be significantly restricted by any of the proposed alternatives. If land management activities may impose a significant restriction on subsistence resources or uses, additional analyses and findings are required. A finding of “significant restriction” requires that the proposed action: 1) be modified to remove the significant restriction, 2) be dropped, or 3) may proceed with the stipulation that formal subsistence hearings are held and subsequent findings published.

### Subsistence Resources and Uses

Salmon and other finfish, shellfish, marine plants and mammals, terrestrial wildlife including deer and other mammals, berries, cedar bark, and timber are all subsistence resources harvested by rural communities in Southeast Alaska. Eighty-five percent of rural Southeast Alaska households reported harvesting subsistence food (Kruse and Muth 1990), and almost one-third of rural households obtained at least half of their food from harvest of subsistence resources. By weight, fish and marine invertebrates accounted for 61 percent of subsistence resource harvest. Deer, other land mammals, and marine mammals represented 21, 4, and 3 percent, respectively, of subsistence harvest (Forest Plan, Final EIS, p. 3-224).

The Licking Creek project area was not reported as a highly significant area for subsistence uses in the Forest Plan. The only two rural communities with documented subsistence uses of Carroll Inlet, including the project area, are Metlakatla and Saxman (Forest Plan, Final EIS, p. 3-605 and 3-641). Subsistence use was confirmed during meetings with tribal representatives.

They reported that individuals from Prince of Wales Island also hunt deer in the Licking Creek area, and confirmed the use of Carroll Inlet for fishing activities. No significant concerns about subsistence resources were identified during consultation with tribal governments or during public scoping.

## Subsistence Use of Deer

The Forest Plan Final EIS provided a comprehensive analysis of subsistence resources and potential effects of management activities for both the Tongass National Forest and for each rural community in Southeast Alaska. That analysis concluded that subsistence use of deer was the resource that might be significantly restricted in the future (Forest Plan, Final EIS, p. 3-224 to 3-229). Therefore, the Forest Service will conduct subsistence hearings for all upcoming timber sale EISs, regardless of the individual project finding of significant or insignificant impacts.

Under subsistence regulations, Ketchikan is considered to be a non-rural community, and Saxman and Metlakatla are rural communities. Most deer hunting in WAA 406 is done by Ketchikan residents, who are not classified as subsistence users. Subsistence users come from Metlakatla and Saxman (ADF&G, deer harvest data). Most of the deer harvest occurs along the shoreline or roads. An average of two deer per year was taken by hunters from rural communities in WAA 406, and an average of 94 deer per year was taken by hunters from rural and non-rural communities combined (Table 3-41). The numbers reported above are estimates based on ADF&G hunter surveys, which may underestimate actual deer harvest, sometimes substantially (D. Person, personal communication).

Forest Plan assumptions for hunter demand project an 18 percent increase for each of the first 2 decades and a 15 percent increase for each of the following 3 decades (Forest Plan Final EIS, page 3-528). Subsistence hunter demand for deer is not expected to exceed 0.1 percent (and total hunter demand to remain below 10 percent) of the habitat capability for WAA 406 by year 2005 or 2035 (Table 3-41).

**Table 3-41**  
**Estimated Deer Harvest by Rural and All Hunters in WAA 406**

	<b>Rural Hunters (% of Habitat Capability)</b>	<b>Rural plus Non-rural Hunters (% of Habitat Capability)</b>
WAA 406, Year 1996-2001	2 (<0.1%)	94 (2.9%)
WAA 406 Projected Deer Demand, Yearly Harvest Numbers 2005	2 (<0.1%)	111 (3.4%)
WAA 406 Projected Deer Demand, Year 2035	4 (0.1%)	173 (5.7%)

Source: J. Llanos, 2001; number of future hunters calculated from Forest Plan demand projections.

## Environmental Consequences

### Direct and Indirect Effects

#### Effects on Subsistence Use of Deer

Declines in deer habitat are measurable and would occur under all action alternatives in areas where old-growth forest is converted into second-growth stands through timber harvest. See the Wildlife section for deer model information and discussions on deer densities by alternative. The proposed timber harvest in this project would reduce current deer habitat capability within WAA 406 by about 1 percent, leaving 81 percent of historical (1954) habitat levels immediately after harvest.



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Project-related activities would not restrict access to deer for subsistence use. New roads are proposed to be closed after completion of harvest activities, but would improve opportunities for walk-in deer hunting from existing roads into new areas. They may also allow hunters to hunt the areas more effectively and increase hunting success. Additional roads would not likely increase the number of hunters, since all access to the project area is by boat or plane.

Table 3-41 displays current and projected hunter demand for deer with respect to deer habitat capability (as predicted by the interagency deer model). Demand is projected to remain at less than 10 percent of capability for the foreseeable future.

## Effects on Other Subsistence Uses

The Licking Creek project area is not known to be important for other subsistence uses. All of the action alternatives would have a minimal effect on anadromous fisheries and marine resources in or adjacent to the project area. (See the Watershed and Fisheries and Log Transfer Facilities sections in this chapter.)

## Cumulative Effects

The cumulative effects of this project and other timber harvest planned in WAA 406 on subsistence use are similar to the direct and indirect effects discussed above. The proposed timber harvest, combined with harvest that will occur from the Madder, Buckdance, and Mop Point/91 Knot Timber Sales would reduce current old-growth habitat within WAA 406 by about 4 percent, leaving 80 percent of historical (1954) POG. Cumulative effects to subsistence access and availability are similar to the discussion above, and could be expected to increase proportionally to any additional timber harvest and road building in WAA 406.

## Finding

For all subsistence resources, it is not expected that project-related, or reasonably foreseeable future activities, would cause a significant possibility of a significant restriction in subsistence resources or uses in WAA 406 or the Licking Creek project area. However, because the Forest Plan analysis showed that deer was the resource that might be significantly affected by implementation of the timber sale program across the entire Tongass National Forest, a subsistence hearing will be held during the public comment period for this Draft EIS.

## Threatened, Endangered and Sensitive Species

This section describes the occurrence of, and project effects on, species that are federally listed, or are proposed for threatened or endangered status. It also includes equivalent information on Forest Service sensitive species. It is based on the Biological Assessment and Biological Evaluation that was prepared for the Licking Creek Timber Sale as required by Section 7 of the Endangered Species Act (ESA), as amended, and the USDA Forest Service Threatened, Endangered and Sensitive Plant and Animal Species Policy (FSM 2670). The BA/BE is available in the Licking Creek project planning record.

The Licking Creek project is located entirely within the boundaries of the area analyzed in the Sea Level Timber Sale EIS. The Sea Level Record of Decision was signed on May 3, 1999. The findings in this section, for wildlife and fish species, are based largely on those reported in the Sea Level BA/BE and on analyses and inventories presented in the Sea Level EIS.

### Affected Environment

#### Threatened and Endangered Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) under the authority of the Endangered Species Act (ESA) of 1973, as amended. Threatened and endangered species potentially occurring in the project area were identified through consultation with the USFW and the NMFS. Consultation correspondence is located in the project planning record. Humpback whales and Steller sea lions may occur in waters adjacent to the project area; these waters are not designated as critical habitat for either species.

#### Humpback Whale

Humpback whales are occasionally found in waters bordering the project area. The local distribution of humpbacks in Southeast Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring (*Clupea harengus*) and euphausiids (shrimp-like crustaceans). Important feeding areas in Alaska waters include Glacier Bay and adjacent portions of Icy Strait, Stephen's Passage/Frederick Sound, Seymour Canal, and Sitka Sound. None of these are within or adjacent to the project area. There would be no effect on humpback whales under any alternative.

#### Steller Sea Lion

Steller sea lions range from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, the Gulf of Alaska, Southeastern Alaska, and south to central California. They are occasionally found in waters bordering the project area. Information on Steller sea lion population trends in Southeast Alaska is limited but suggests that populations are stable. There are no known Steller sea lion haul-out locations in Carroll Inlet; the closest is near Grindall Island, near Prince of Wales Island, about 30 air miles to the west. There would be no effect on Steller sea lions under any alternative.

#### Forest Service Sensitive Species

The Forest Service Regional Forester may also designate as "sensitive" species for which a viability concern has been identified due to a predicted or documented downward trend in populations or habitat and where continued downward trends may lead to local or forest-wide extirpation, Federal listing under the ESA, or both. The 14 sensitive plant and animal species that could potentially occur in or near the Licking Creek project area are summarized in Table 3-42. A complete analysis of sensitive species that may potentially be impacted by the Licking Creek project has been prepared and presented in the Biological Assessment and Biological Evaluation (BA/BE), which is available in the project planning record.

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The Licking Creek project area is entirely within the boundary of the Sea Level EIS. From 1993 to 2000, field crews completed goshawk surveys along 87 routes, which included 512 broadcast stations, within the Sea Level project area. Approximately 387 call stations were located in or adjacent to potential Sea Level harvest units. In addition, long watches (Crocker-Bedford, 1997) and early morning listening stations (Penteriani, 1999) were done. Goshawk surveys followed the protocol established for the Alaska Region Goshawk Inventory Protocol, first issued on June 24, 1992. Field crews found no goshawk nests, but reported a possible goshawk detection in 1995. District records and databases indicate several incidental goshawk sightings within the Sea Level project area. The two most dependable sightings both occurred in 1996. Wildlife crews surveyed these areas but did not locate a nest or record additional goshawk detections. Additional surveys were conducted during 2002 for goshawks, also with no detections.

Table 3-42  
Alaska Region Sensitive Species that May Occur in the Licking Creek Project Area

Common Name	Scientific Name	Surveys Conducted?	Observed in Project Area?	Determination
Queen Charlotte goshawk	<i>Accipiter gentilis laingi</i>	Yes	No	May affect <sup>1</sup>
Trumpeter swan	<i>Cygnus buccinator</i>	Yes	Yes	Not adverse <sup>2</sup>
Osprey	<i>Pandion haliaetus</i>	No	No	No effect
Peale's peregrine falcon	<i>Falco peregrinus pealei</i>	No	No	No effect
Goose-grass sedge	<i>Carex lenticularis var. dolia</i>	Yes	Yes	No effect
Edible thistle	<i>Cirsium edule</i>	Yes	No	No effect
Davy mannagrass	<i>Glyceria leptoctachya</i>	Yes	Yes	Not adverse
Wright filmy fern	<i>Hymenophyllum wrightii</i>	Yes	No	May affect
Truncate quillwort	<i>Isoetes truncata</i>	Yes	No	No effect
Calder's lovage	<i>Ligusticum calderi</i>	Yes	No	Not adverse
Bog orchid	<i>Platanthera gracilis</i>	Yes	No	No effect
Loose-flowered bluegrass	<i>Poa laxiflora</i>	Yes	No	Not adverse
Unalaska mist-maid	<i>Romanzoffia umalaschensis</i>	Yes	No	No effect
Queen Charlotte butterweed	<i>Senecio moresbiensis</i>	Yes	No	Not adverse

<sup>1</sup> May affect individuals; not likely to adversely affect population viability

<sup>2</sup> Not likely to adversely affect

Source: J. Zelenak, K. Dillman, 2001

## Environmental Consequences

### Direct and Indirect Effects

No adverse effects to whales or sea lions are anticipated from implementation of any of the alternatives. Important feeding and haul-out areas for these species are not known to occur in waters adjacent to Licking Creek project area nor are they designated as critical habitat. Forest Plan Standards and Guidelines for threatened and endangered species (Forest Plan S&G I.A., B., & C., page 4-88 and VII. A. page 4-114) are being met. All project-related activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching whales, sea lions, and other marine mammals.

Most goshawk nesting habitat is within the protected beach/estuary reserve. Alternatives 2 through 5 would decrease low-elevation POG by 1 to 5 percent in the VCU. Approximately 26 to 29 percent of the VCU would be in second growth which is consistent with viability strategies. All alternatives fully incorporate Forest Plan Standards and Guidelines for trumpeter swans. These forbid disturbance of trumpeter swans, particularly during the nesting, brood-rearing, and wintering periods. If trumpeter swans are observed using habitats within the project area, road building and timber harvesting would be prohibited within 0.5 miles of these habitats when swans are present (usually from November 1 to April 1). No breeding pairs of osprey or nests have been recorded on the project area. However, migrating birds may stop at small lakes and streams to rest and feed. Only one small lake occurs within the project area. No harvest would occur within the adjacent riparian buffer zones. Therefore, none of the action alternatives would impact ospreys. No nest sites for Peale's peregrine falcon have been found in the project area, nor have any observations been reported. There would be no impact on this species.

Goose-grass sedge and Davy mannagrass were the only sensitive plant species recorded in the project area. Because goose-grass sedge is expected to occur in subalpine habitats, no effects are anticipated from this project. Forest Plan Standards and Guidelines protect most of Davy mannagrass habitat from disturbance, though smaller streams may not receive buffers in the project. Populations were found well outside any proposed unit boundary near Unit 1. The probability of adverse effects are low because the habitats they occupy are sub-alpine and will not be included in the timber base for harvest. Therefore, the overall risk to this species due to project activities is low; hence the determination is "not likely to adversely affect".

### Cumulative Effects

#### Alternative 1

The No-action Alternative would have no adverse effects on any threatened, endangered or sensitive animal or plant species in the project area. Viable populations would be maintained in the project area and larger landscape.

#### Alternatives 2, 3, 4 and 5

The majority of threatened, endangered, and sensitive animal and plant species do not occur in the project area, and would not be affected. Twenty-nine to 32 percent of VCU 7460 would be second growth under the cumulative impact of Alternatives 2 through 5 and other foreseeable sales in the area. This is consistent with goshawk viability strategies.



## Wetlands and Floodplains

This section reviews the existing information on the Licking Creek project area for management of wetlands. Information from the Forest Service's GIS database, and field surveys of the project area were used. A Forest-wide treatment of wetlands may be found in the Water section of the Forest Plan Final EIS, Chapter 3, and the Forest Plan, Chapter 4. The unit and road cards (Appendix B) contain additional site-specific mitigation measures for implementation.

### Affected Environment

#### Wetlands

Wetlands are defined as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.41(a)(1)). Identification of wetlands is based on the Corps of Engineers three-parameter system described in U.S. Army Corps of Engineers Wetlands Delineation Manual (COE 1987). Wetlands are identified as areas having hydric soils, hydrophytic vegetation, and wetland hydrology. Soil resource inventory maps, including correlations between soil series and plant communities were used to determine the extent of wetlands in the project area. Hydrologic parameters are inferred from the soil moisture regime.

Using this wetland definition and delineation method, approximately 31 percent (4,494 acres) of the Licking Creek project area is classified as wetlands (Table 3-43).

Wetlands provide various ecological functions, including surface flow and groundwater regulation, sediment retention, nutrient storage, and temperature moderation. They provide terrestrial, aquatic and marine wildlife habitats, biological diversity, and wood fiber. Wetland areas also provide socio-economic benefits, which include areas for wildlife viewing, hunting and recreation, habitat for commercial fishing (salmon) stocks, development sites (such as buildings and roads), community water supplies, and timber harvesting.

#### Wetland Types

Six broad types of wetlands occur on the project area. These wetland types have different soil and vegetative communities, occupy different landscape positions, and have somewhat different functions and values.

**Muskeg** – Bogs (commonly called muskegs) are dominated by sphagnum moss with a wide variety of other plants adapted to very wet, acidic, organic soils. They typically contain some stunted lodgepole pine and hemlock trees. This wetland type includes raised bogs, sloping "poor fens," and some shrub-scrub coniferous wetlands. Muskegs function as areas of groundwater recharge and streams and for deposition and storage of sediment and nutrients, and provide biological and vegetative diversity in the landscape. Muskegs are most commonly found in broad valley bottoms, on rounded hilltops and on rolling lowlands in the project area.

**Alpine/Subalpine Muskeg** – This type is a combination of muskeg and sedge meadows on peat deposits, and low-growing blueberry and heath on higher rises. Stunted lodgepole pine and mountain hemlock are common. These wetlands are important for snow storage and can be a source of snowmelt water throughout the summer. They also provide summer habitat for terrestrial wildlife species. These wetlands are located at elevations of 1,200 to 2,500 feet. Many of these habitats in the Licking Creek project area are heavily used during the summer months by deer and bear.

**Sedge Fens** – Fens are diverse communities of sedges, dominated by tall sedges such as Sitka sedge, with a variety of forbs and occasional stunted trees, usually spruce or hemlock. Soils are

deep organic muck, often with thin layers of alluvial mineral soil. They occur in landscape positions where they receive some runoff from adjacent slopes, resulting in richer nutrient status than muskegs. These wetlands function as areas for recharge of groundwater and streams, deposition and storage of sediment and nutrients, and as waterfowl and terrestrial wildlife habitat, including black bear, mink, river otter, and beaver. Many sedge fens contain beaver ponds that provide high-quality waterfowl and salmon-rearing habitat.

**Forested Wetlands**— These wetlands typically have hemlock, cedar, or mixed conifer overstories, and ground cover consisting largely of skunk cabbage and deer cabbage. They occur on poorly or very poorly drained hydric soils. They are most common on broad glacial valley bottoms, and on gently sloping hillslopes or benches. These wetlands function as recharge areas for groundwater and streams, and for deposition of sediment and nutrients. They also produce commercial forest products.

**Muskeg/Forested Wetland Mosaic** – Small patches of muskegs and forested wetlands can be arranged in a mosaic pattern on the landscape. The vegetation in these types are the same as described above, but function somewhat differently as habitats due to their small size and spatial arrangement.

**Forested Wetland/Upland Mosaic** – Small patches of forested wetland can occur intermixed with forested non-wetland ecosystems. The wetland portion is typically in concave areas within gently sloping or rolling landscapes.

Wetland types that are relatively scarce within the larger landscape may be considered more biologically significant. In the Licking Creek project area, sedge fens, lower-elevation muskegs, and lakes and ponds are the least-abundant wetland types (Table 3-43).

Table 3-43  
Wetland Types in the Licking Creek Project Area

Wetland Type <sup>1</sup>	Approximate Number of Acres within Project Area	Percent of Project Area
Alpine/Subalpine Muskeg	1,965	14%
Forested Wetlands	1,309	9%
Sedge Fens	131	0.9%
Lakes and Ponds	3	0.02%
Muskeg	148	1%
Muskeg/Forested Wetland Mosaic	413	3%
Forested Wetland/Upland Mosaic	525	4%
<b>Total Wetlands<sup>1</sup></b>	<b>4,494</b>	<b>31%</b>
Uplands (Non-Wetlands)	9,951	69%

<sup>1</sup> Sum total of individual percentages may not equal 100% due to rounding errors.

Source: P. Frohne, GIS, 2001

## Effects of Past Timber Harvest on Wetlands

Section 404 (f) (1) (A) and (E) of the Federal Clean Water Act exempts silvicultural, timber harvesting, and related road construction activities from permit requirements for the discharge of dredge and fill materials in wetlands. Executive Order 11990, as amended (42 U.S.C. 4321 et seq.), however, requires Federal agencies having statutory authority and leadership over Federal lands to avoid, to the extent possible, the short- and long-term adverse impacts associated with the destruction or modification of wetlands. Where feasible, direct and indirect support of new construction in wetlands must be avoided. Federal agencies are also required to preserve or enhance the beneficial values of wetlands in their land management actions.

### 3 Environment and Effects

The predominant effect of timber harvest activities on wetlands is from excavating or filling for features such as roads, landings, and log transfer facilities. Roads are located outside of wetlands, to the maximum extent practicable, to maintain their function. Where it is necessary to cross wetlands, appropriate BMPs and mitigation measures are incorporated into road designs. Road construction covers wetland vegetation with rock, resulting in permanent loss of wetlands covered by the road prism, and in subtle changes in vegetation for distances of up to 20 feet on the downhill side of the road. By minimizing the amount of side-ditching, effects upon groundwater flow and alteration of soil moisture levels are minimized. In a study on Wrangell Island, McClellan and D'Amore (1996) found that the effects of roads on drainage are usually noticeable within only a meter or two of roadside ditches. McGee (2000) found that drainage ditches collect and divert overland flow and shallow subsurface flow to the nearest stream channel, resulting in minimal effects on soil wetness in the soil adjacent to the road prism.

Harvesting timber from forested wetlands temporarily changes the hydrology of the site and may cause an increase in water yield (Patric 1966), due to the reduction in forested vegetation. Forest vegetation evaporates and transpires water from the soil, and soil moisture may be elevated until adequate re-growth has occurred. These conditions typically persist longer than on upland sites, as tree growth on wetland sites is slower than on adjacent upland sites.

Table 3-44 shows the existing miles of road and previous timber harvest that have occurred on wetlands across the Licking Creek project area.

Table 3-44  
Existing Miles of Road and Past Harvest on Wetlands and Non-wetlands  
(Watersheds)<sup>1</sup>

	Existing Miles of Road	Past Harvest
Wetlands	9.56	564 acres
Non-wetlands	28.60	3,314 acres
<b>Total</b>	<b>38.16</b>	<b>3,878 acres</b>

<sup>1</sup> Total is calculated on a watershed scale for the project area. Since watershed boundaries extend outside the project area, totals shown here are greater than within the project area alone.

Source: GIS query, P. Frohne, 2001

### Floodplains

Floodplains are composed of naturally eroded sediments carried by a stream or river and deposited in slack-water sections of channels during high-water periods. Floodplains are considered to be areas subject to a 1 percent or greater chance of flooding in any given year (at least 1 year in 100-year recurrence). Floodplain soils are formed in waterborne sediments (alluvium). Alluvial fans are formed where streams and rivers transition from fast-moving water (high-gradient) to slow-moving (low gradient), and soil materials are deposited by gravity. Floodplain and alluvial fan soils in the project area are typically coarse textured and well drained. Alluvial fans provide fish-rearing habitat. Wildlife use floodplains for forage and travel corridors.

Approximately 437 acres of floodplains and alluvial fans are within the Licking Creek project area. Current Forest-wide Riparian Standards and Guidelines prohibit timber harvest on the active portion of floodplains. A total of 1.19 miles of existing roads cross floodplains. None of the alternatives propose new road construction in floodplains. Consequently, potential effects on floodplains would be negligible, and they are not discussed further.

## Environmental Consequences

### Direct and Indirect Effects

The predominant effect of the proposed project upon wetlands would be from road construction. It is not always possible, or desirable, to locate forest roads on upland sites rather than on wetlands. However, the proportion of wetlands in the project area being converted to roads is relatively small (Table 3-45), and no roads are proposed to be constructed on the most biologically significant wetlands within the project area. Appropriate BMPs and mitigation measures would be incorporated into road designs. If Alternative 1 were chosen, the existing wetlands would continue to function in their current state. More miles of new road would be constructed on wetlands under Alternative 4 than under Alternatives 2 or 3. Alternative 5 builds no new roads.

Table 3-45  
Miles of Proposed Road on Wetlands by Wetland Type (Watersheds)<sup>1</sup>

Wetland Type	Alt. 1 <sup>1,3</sup> (existing)	Alt. 2 <sup>3</sup>	Alt. 3 <sup>3</sup>	Alt. 4 <sup>3</sup>	Alt. 5 <sup>3</sup>
Alpine/Subalpine Muskeg	0.48	0.06	0.06	0	0
Forested Wetlands	6.62	0	0	0	0
Sedge Fens	0.13	0	0	0	0
Lakes and Ponds	0	0	0	0	0
Muskeg	1.19	0.24	0.24	0.30	0
Muskeg/Forested Wetland Mosaic	0	0	0	0	0
Forested Wetland/Upland Mosaic	1.14	0	0	0	0
<b>Total (Road Miles on Wetlands)<sup>1,3</sup></b>	<b>9.56</b>	<b>0.30</b>	<b>0.30</b>	<b>0.30</b>	<b>0</b>
Acres of wetland converted to road <sup>2</sup>	27.72	0.87	0.87	0.87	0
Cumulative wetland acres converted to road	27.72	28.59	28.59	28.59	27.72

<sup>1</sup> Total is calculated on a watershed scale for the project area. Since watershed boundaries extend outside the project area, totals shown here are greater than within the project area alone.

<sup>2</sup> Based on 2.9 acres of disturbance per mile of constructed road.

<sup>3</sup> Alt. 1 displays currently existing road miles and acres. Alts. 2, 3, and 4 display the additional miles and acres that would be added to the existing condition, under each action alternative.

Source: P. Frohne, 2002

Classified roads typically include a road surface of approximately 16-foot width and a varying width roadside ditch and/or fill-slope, depending upon slope, topography, soil type, and drainage. Effects of road building in wetlands will be minimized by avoiding overburden disposal in wetlands, along with minimizing road clearing limits and side-ditching. (Refer to the road cards in Appendix B for details.)

Soil moisture would be elevated until transpiration and interception surfaces were equivalent to pre-harvest conditions, and water yield may increase.



### 3 Environment and Effects

Table 3-46  
Proposed Timber Harvest on Wetlands

	Previous Harvest	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>Wetlands</b>						
Acres of proposed forested wetland <sup>1</sup> harvest	564	0	51	133	188	147
Percent of forested wetland acres in project area	25%	0	2.9%	7.7%	10.9%	8.5%
Percent of project area	3%	0	0.4%	0.9%	1.3%	1.0%
<b>Non-wetlands</b>						
Acres of proposed harvest on non-wetlands	3,314	0	202	440	602	618
<b>Project Area Total</b>	<b>3,878</b>	<b>0</b>	<b>253</b>	<b>573</b>	<b>790</b>	<b>765</b>

<sup>1</sup> Includes forested wetland/upland mosaic.

Source: P. Frohne, 2001

#### Alternative 1

No additional wetlands would be impacted in the project area.

#### Alternative 2

The direct and indirect effects of Alternative 2 pose the fourth-highest risk to wetlands. Proposed activities would occur on 51.87 acres of wetlands, 0.87 of which would be permanently lost due to conversion to road.

#### Alternative 3

The direct and indirect effects of Alternative 3 pose the third-highest risk to wetlands. Proposed activities would occur on 133.87 acres of wetlands, 0.87 of which would be permanently lost due to conversion to road.

#### Alternative 4

The direct and indirect effects of Alternative 4 pose the highest risk to wetlands. Proposed activities would occur on 188.87 acres of wetlands, 0.87 of which would be permanently lost due to conversion to road.

#### Alternative 5

The direct and indirect effects of Alternative 5 pose the second-highest risk to wetlands. Proposed activities would occur on 147.87 acres of wetlands, 0.87 acres of which would be permanently lost due to conversion to road.

### Cumulative Effects

Both past (1970-2001) and future activities (2002-2012) were reviewed to estimate the cumulative effects of timber harvest and associated roads on wetlands within the Licking Creek project area. Design specifications for National Forest System lands would minimize road placement on high-value wetlands (those that are scarce in the project area, such as sedge fens), unless unavoidable due to existing side-slope conditions. Approximately 9.56 miles of road have been constructed to date on wetlands within the project area. The action alternatives for this project range from approximately 0.8 miles to 1.5 miles of new road construction on wetlands. For the Madder Timber Sale, 0.4 miles of road will be constructed in wetlands. One 9-acre unit of the Mop Point/91 Knot Timber Sale is within the project area. It is estimated that 0.1 mile of road will be built to access this unit, none of which will be constructed on wetlands.

Approximately 564 acres of forested wetlands have been harvested to date within the project area. Within the project area, 41 acres of forested wetland are scheduled for harvest as part of the Madder Timber Sale. No forested wetlands fall within the unit boundaries. Action

alternatives for the Licking Creek project range from 51 to 188 acres of forested wetland harvest.

## Other Environmental Considerations

Several resources and uses of the Licking Creek project area are likely to remain unaffected by the action alternatives, or would not be affected to a significant degree. Even though significant effects are not anticipated, we discussed the potential for measurable effects or differences between the alternatives in the preceding resource sections. Resources or uses for which no measurable effects were identified are discussed briefly here.

### Air Quality

All of the action alternatives would have limited, short-term effects on ambient air quality. Such effects, in the form of vehicle emissions and dust, are likely to be indistinguishable from other local sources of airborne particulates, including other motor vehicle emissions, dust from road construction and motor vehicle traffic, logging camp energy sources, and marine traffic. The action alternatives could result in short-term supplies of raw wood products to local mills. It is the responsibility of the mill owner or sortyard operator to ensure that mill emissions are within legal limits.

### Facilities

There are no logging camps or Forest Service administrative sites in the Licking Creek project area. The project area is approximately 20 miles northeast of Ketchikan, Alaska.

### Land Status

Under the Alaska Statehood Act of 1959, the State of Alaska is entitled to a certain amount of Federal land. Other legislation granted Alaska Native corporations similar selection rights. There are no State-selected lands, or lands selected by the Cape Fox Native Corporation, within the Licking Creek project area.

The implementation of the proposed alternatives would require the expenditure of energy (consumption of fuel). The amount of energy used varies by alternative, based upon the timber volume harvested, the type of harvest system used, the amount of road constructed, and the sale preparation and administration.

### Fuel Consumption

Fuel consumption estimates are based upon estimates. These estimates are likely to be a little high for the Licking Creek project due to logistical advantages of working on Revillagigedo Island versus more remote sites. Fuel consumption requirements were estimated as follows:

Timber Sale Preparation and Administration	1.56 gallons per MBF
Cable Logging	2.00 gallons per MBF
Helicopter Logging	8.00 gallons per MBF
Load, Haul, Dump, and Tow	8.00 gallons per MBF
Road Construction	4,000 gallons per mile
Road Maintenance	20 gallons per mile

The estimated fuel consumption required for each alternative is displayed in Table 3-47.

## Energy Requirements and Conservation Potential

**Table 3-47**  
Estimated Fuel Consumption by Alternative (in Thousands of Gallons)

Activity	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Logging	0	26,400	55,600	52,200	101,800
Load, Haul, Dump, Tow	0	43,200	95,200	134,400	128,800
Road Construction	0	6,000	8,800	22,000	0
Road Maintenance	0	1,280	2,560	3,040	2,880
Timber Sale Prep/ Administration	0	8,424	18,564	26,208	25,116
<b>Total Consumption</b>	<b>0</b>	<b>85,304</b>	<b>180,724</b>	<b>237,848</b>	<b>258,596</b>
Average Gallons/ MBF	0	15.80	15.19	14.16	16.06

Source: D. Fletcher, 2001

## Conservation Potential

To conserve fuel, and to minimize costs, the Forest Service has undertaken studies nationwide and on the Tongass National Forest. This has allowed experimentation with new or different techniques. Cable yarding uses about 75 percent as much fuel as shovel yarding and about 25 percent as much fuel as helicopter yarding. However, helicopter yarding can reduce road-building needs, saving fuel needed for road construction, road maintenance, and trucks hauling logs on the roads.

The use of low-tire-pressure equipment during road construction and logging has also been shown to decrease costs, both in nationwide studies and in studies on the Tongass. Studies on Mitkof Island indicate that 10-14 percent less rock was needed during road construction, resulting in a cost savings of approximately \$450,000. It is predicted that costs for rock replacement/road maintenance, log truck fuel, and tire repair/replacement will decrease using this system. Cost savings have been proven to be substantial enough that the Forest Service provides a contract provision allowing a reduction in deposits for rock replacement when low-tire-pressure equipment is used.

The use of cable yarding equipment fitted with mechanical or hydraulic interlocks reduces yarding costs, because one does not have to ride the throttle and brake simultaneously to provide deflection for the turn of logs.



### 3 Environment and Effects



Licking Creek karst; photo by Alan Murray

# Chapter 4

## Lists



# Chapter 4

## Lists

### Preparers

The following is a list of contributors to the Licking Creek Environmental Impact Statement. Other Forest Service employees contributed to the completion of this document through their assistance in support functions. Their help is greatly appreciated.

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A copy of the Licking Creek Timber Sale Draft EIS was sent to the following agencies, organizations, businesses, public officials, municipalities and IRA tribes. These parties either commented on the project, requested a copy of the EIS during the scoping process or at some other time in the NEPA process, are part of the Forest Service's mandatory mailing list (Forest Service Handbook 1909.15, Sections 23.2 and 63.1) or are recognized municipalities or IRA tribes potentially affected by, or interested in, the Licking Creek project.

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Flora Feller, Ketchikan, AK	Jeffrey Rodger, Ketchikan, AK
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## Glossary

### Access

The opportunity to approach, enter, and make use of public lands.

### Access Management

Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands (physical attributes).

### Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 National Forest Wilderness areas in Southeast Alaska. The Alaska National Interest Lands Conservation Act of December 2, 1980, Public Law 96-487, 96th Congress, 94 Stat. 2371-2551, Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

### Native Claims Settlement Act (ANCSA) Alaska Native Claims Settlement Act (ANCSA)

Public Law 92-203, 92nd Congress, 85 Stat. 2371-2551. Approved December 18, 1971, Native Claims Settlement Act (ANCSA) ANCSA provides for the settlement of certain land claims of Alaska Natives and for other purposes.

### Adfluvial

Adfluvial habitat is a tributary stream that provides spawning and juvenile rearing habitat for salmonids that grow to maturity in a lake and then return to spawn in the tributary. An adfluvial fish is a species or population of fish that does not go to sea, but lives in lakes and enters streams to spawn.

### Alluvial Fan

A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

### Alpine

Parts of mountains above tree growth and/or the organisms living there.

### Alternative

One of several policies, plans, or projects proposed for decision making.

### Anadromous Fish

Anadromous fish (such as salmon, steelhead, and sea-run cutthroat trout) spend part of their lives in freshwater and part of their lives in saltwater.

### Aquatic Habitat Management Unit (AMHU)

A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.

*Class I:* Streams and lakes with anadromous or adfluvial fish habitat, or high-quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

*Class II:* Streams and lakes with resident fish populations and generally steep (6-15 percent) gradient (can also include streams from 0-5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

*Class III:* Perennial and intermittent streams with no fish populations but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

*Class IV:* Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

*Non-streams:* Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

### **Background**

The distant part of a landscape. The seen or viewed area located from 3 or 5 miles to infinity from the viewer. (See "Foreground" and "Middleground".)

### **Beach Fringe**

The area inland from salt water shorelines, which is typically forested.

### **Bedload**

Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water.

### **Best Management Practice (BMP)**

Practices used for the protection of water quality. BMPs are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMPs are standards to be achieved, not detailed or site-specific prescriptions or solutions. BMPs as defined in the USDA Forest Service Soil & Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

### **Biological Diversity (Biodiversity)**

The variety of life in all its forms and at all levels. This includes the various kinds and combinations of: genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

### **Biological Potential**

The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

### **Blowdown**

See windthrow.

### **Board Foot (BF)**

A unit of wood 12" X 12" X 1". One acre of commercial timber in Southeast Alaska on the average yields 28,000-34,000 board feet per acre (ranging from 8,000-90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering 1 acre 2 feet thick. One million board feet yields approximately enough timber to build 120 houses or 75,555 pounds of dissolving pulp.

### **Braided Streams or Channels**

A stream flowing in several dividing and reuniting channels resembling the strands of a braid, the cause of division being the obstruction by sediment deposited by the stream.

### **Buffer**

An area around a resource where timber harvest is restricted or prohibited. For example, the Tongass Timber Reform Act (TTRA) requires that timber harvest be prohibited in an area no less than 100 feet on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a "stream buffer".

### **Capability**

An evaluation of a resource's inherent potential for use.

### **Channel Migration**

Movement of a stream or river channel within a floodplain area usually over an extended period of time.

### **Clearcut**

The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

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### **Code of Federal Regulations (CFR)**

A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

### **Commercial Forest Land (CFL)**

Productive Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

*Normal CFL:* Timber that can be economically harvested with locally available logging systems. Composed of two categories:

*Standard:* Timber that can be economically harvested with locally available logging systems, such as highlead or short-span skyline.

*Special:* Timber that is in areas where special consideration is needed to protect other resources but can be harvested with locally available logging systems.

*Non-standard CFL:* Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or long-span skyline.

### **Commercial Thinning**

Thinning a stand where the trees to be removed are large enough to sell.

### **Connectivity**

A measure of the extent that forest areas between or outside reserves provide habitat for breeding, feeding, dispersal, and movement.

### **Corridor**

Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

### **Cover**

Refers to trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

### **Critical Habitat**

Specific terrain within the geographical area occupied by threatened or endangered species. Physical and biological features that are essential to conservation of the species and which may require special management considerations or protection are found in these areas.

### **Crown**

The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.

### **Cruise**

Refers to the general activity of determining timber volumes and quality as opposed to a specific method.

### **Cubic Foot (CF)**

Equivalent to a cube of wood with 1-foot sides. The cubic foot volume is a measure of the total sound wood in a tree and is a more accurate depiction of wood volume than the board foot measure. This is usually referred to in CCF (hundred cubic feet).

### **Cull Logs**

Trees that do not meet certain quality specifications.

### **Cumulative Effects**

The impacts on the environment resulting from additional incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

**Cutover**

Areas harvested recently.

**Diameter Breast Height (DBH)**

The diameter of a tree measured 4 feet 6 inches from the ground.

**Deer Winter Range**

Locations that provide food and shelter for Sitka black-tail deer under moderately severe to severe winter conditions.

**Degradation**

The general lowering of the surface of the land by erosive processes, especially by the removal of material through erosion and transportation by flowing water.

**Developed Recreation**

Recreation that requires facilities that, in turn, result in concentrated use of an area. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

**Direct Effects**

Direct environmental effects are those occurring at the same time and place as the initial cause or action.

**Direct Employment**

The jobs that are immediately associated with the Long-term Contract Timber Sale, including, for example, logging, sawmills, and pulp mills.

**Diversity**

The distribution and abundance of different plant and animal communities and species within the area controlled by the modified 1997 Forest Plan.

**Draft Environmental Impact Statement (Draft EIS)**

A statement of environmental effects for a major Federal action which is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

**Eagle Nest Tree Buffer Zone**

A 330-foot radius around eagle nest trees established in an agreement between the U.S. Fish and Wildlife Service and the Forest Service.

**Ecological Province**

Twenty-one ecological subdivisions of Southeast Alaska that are identified by generally distinct ecological, physiographic, and biogeographic features. Plant and animal species composition, climate, and geology within each province are generally more similar within than among adjacent provinces. Historical events (such as glaciers and uplifting) are important to the nature of the province and to the barriers that distinguish each province.

**Ecosystem**

A community of organisms and its physical setting. An ecosystem, whether a fallen log or an entire watershed, includes resident organisms, non-living components such as soil nutrients, inputs such as rainfall, and outputs such as organisms that disperse to other ecosystems.

**Effects**

Effects, impacts, and consequences as used in this environmental impact statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social, and may be direct, indirect, or cumulative.



## 4 Lists

*Direct Effects:* Results of an action occurring when and where the action takes place.

*Indirect Effects:* Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.

*Cumulative Effects:* See Cumulative Effects.

### **Encumbered Lands**

Lands with a claim, lien, charge, or liability attached to and binding real property.

### **Endangered Species**

Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as Endangered in accordance with the 1973 Endangered Species Act. See also Threatened Species, Sensitive Species.

### **Endemic**

Restricted to a particular locality. For example, a particular species or subspecies may occur on only one or a very few islands.

### **Erosion**

The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities. .

### **Escapement**

Adult anadromous fish that escape from all causes of mortality (natural or human-caused) to return to streams to spawn.

### **Estuary**

For the purpose of this EIS process, estuary refers to the relatively flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

### **Even-aged Management**

The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

### **Executive Order**

An order or regulation issued by the President or some administrative authority under his or her direction.

### **Final Environmental Impact Statement (Final EIS)**

The final version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act. It is a revision of the draft environmental impact statement (Draft EIS) to include public and agency responses to the draft. The decision maker chooses which alternative to select from the Final EIS, and subsequently issues a Record of Decision (ROD).

### **Floodplain**

That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.

### **Fluvial**

Of or pertaining to streams and rivers.

### **Foreground**

The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; area located less than 1/4 mile from the viewer. See also Background and Middleground.

### **Forest and Rangeland Renewable Resources Planning Act of 1976 (RPA)**

Amended in 1976 by the National Forest Management Act. See RPA Assessment and Program.

**Forest or Forest Land**

National Forest lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and non-commercial forest land.

**Forested Wetland**

A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.

**Forest Plan**

The Tongass Land Management Revision, signed in 1997. This is the 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the forest.

**Fragmentation**

An element of biological diversity that describes the natural condition of habitats in terms of the size of discrete habitat blocks or patches, their distribution, the extent to which they are interconnected, and the effects of management on these natural conditions. Also the process of reducing the size and connectivity of stands within a Forest.

**FSH**

Forest Service Handbook.

**FSM**

Forest Service Manual.

**Geographic Information System (GIS)**

An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision-making process. It is a system of computer maps with corresponding site-specific information that can be electronically combined to provide reports and maps.

**Geomorphology**

The study of the forms of the land surface and the processes producing them. Also the study of the underlying rocks or parent materials and the landforms present which were formed in geological time.

**Guideline**

A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

**Habitat**

The sum total of environmental conditions of a specific place occupied by an organism, population, or community of plants and animals.

**Habitat Capability**

The number of healthy animals that a habitat can sustain. Used in wildlife models to calculate rough population estimates for management indicator species.

**Habitat Suitability Index (HSI)**

This is a value assigned to a unit of land using a computerized model that related vegetative and geographic characteristic (e.g. stand volume, proximity to a stream or cliff, slope, aspect, etc.) to the land unit's value for a particular wildlife species. Values generally range from 0 to 1, with 1 being the best. The Habitat Capability Models used to generate HSIs were developed by interagency teams of biologists using the best available information including research results and best professional judgement.

**Heritage Resources**

Historic or prehistoric objects, sites, buildings, structures, and their remains, resulting from past human activities.

**Indirect Effects**

Indirect environmental effects are those that occur later in time or are spatially removed from the cause or action.

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## **Indirect Employment**

The jobs in service industries that are associated with the Long-term Contract timber sale including, for example, suppliers of logging and milling equipment.

## **Inoperable Timber**

Timber that cannot be harvested by any proven method because of potential resource damage, extremely adverse economic considerations, or physical limitations.

## **Interdisciplinary Team (IDT)**

A group of people with different backgrounds assembled to research, analyze, and write a project Environmental Impact Statement. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

## **Irretrievable Commitment**

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. Such decisions are reversible, but the production opportunities foregone are irretrievable. The construction of roads for timber harvesting is an irretrievable action, because of the time needed for a constructed road to revert to natural conditions.

## **Irreversible Commitment**

Irreversible commitments are decisions affecting non-renewable resource such as soils, minerals, plant and animal species, and cultural resources. Such commitments are considered irreversible when the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or because the resource has been destroyed or removed. The conversion from an unroaded to a roaded state may be considered an irreversible commitment.

## **Issue**

A point, matter, or section of public discussion or interest to be addressed or decided.

## **Knutsen-Vandenburg Fund (KV)**

The portion of timber sale receipts collected and used for reforestation and other renewable resource projects on the sale area.

## **Land Allocation**

The decision to use land for various resource management objectives to best satisfy the issues, concerns and opportunities and meet assigned forest output targets.

## **Land Use Designation**

A defined area of land specific to which management direction is applied in the modified 1997 Forest Plan.

## **Landslides**

The moderately rapid to rapid down slope movement of soil and rock materials that may or may not be water-saturated.

## **Large Woody Debris**

Any large piece of relatively stable woody material having a diameter of at least 4 inches and a length greater than 3 feet that intrudes into the stream channel. Also called Large Organic Debris (LOD).

## **Log Transfer Facility (LTF)**

A facility that is used for transferring commercially-harvested logs to and from a vessel or log raft, or the formation of a log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility" or "log dump".

## **Logging Systems**

*Long-span cable:* Single span cable yarding system with a long corner exceeding 1000 feet, horizontal distance. Typically, this includes a variety of live skyline systems, including standing skylines and running skylines where reach is long.

*Short-span cable:* All cable systems with a longer corner of not more than 1000 feet, horizontal distance. Typically, this includes running skyline with a carriage and chokers, running skyline with grapple, live skyline with gravity return, and highlead.

*Running skyline:* A yarding system with three suspended moving lines, generally referred to as the main, haulback, and slack-pulling, that when properly tensioned will provide lift, travel, and control to the carriage; normally indicates a gantry type tower and a three-drum yarder.

*Shovel:* The process of forwarding logs from stump to landing by repeated swinging of logs by a hydraulic excavator-based log loader.

*Helicopter:* Flight path cannot exceed 40 percent downhill or 30 percent uphill; landings must be selected so there is adequate room for the operation and so that the helicopter can make an upwind approach to the drop zone.

### **Long-Term Productivity**

Long-term productivity refers to the capability of the land and resources to continue producing goods and services for 50 years and beyond.

### **MBF**

A thousand board feet net sawlog and utility volume.

### **MMBF**

A million board feet net sawlog and utility volume.

### **Management Indicator Species (MIS)**

Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

### **Management Prescriptions**

Management practices and intensity selected and scheduled for application on a specific area (e.g., a land use designation) to attain multiple-use and other goals and objectives.

### **Management Requirement**

Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, and soil and water and diversity, to be met in accomplishing National Forest System goals and objectives (see 36 CFR 219.17).

### **Mass Movement**

The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture and does not include individual soil particles displaced as surface erosion.

### **Maritime Climate**

Weather conditions controlled by an oceanic environment characterized by small annual temperature ranges and high precipitation.

### **McGilvery (Soil Series)**

Soil series which represents the only well-drained organic soil found in the Ketchikan Area. It is composed of a thin surface layer (less than 8 inches deep) of organic material overlying bedrock. These soils are associated with cliffs and rock outcrops, and are sensitive to disturbance.

### **Memorandum of Understanding (MOU)**

A legal agreement between the Forest Service and others agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.

### **Middleground**

The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly for the landscape; area located from 1/4 to 5 miles from the viewer. See also Foreground and Background.



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### **Mineral Soils**

Soils consisting predominately of, and having its properties determined by, mineral material.

### **Minimum Viable Population**

A population with the estimated numbers and distribution of reproductive individuals to maintain the population over time.

### **Mitigation**

Measures designed to counteract environmental impacts or to make impacts less severe. These may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

### **Mixed Conifer**

In Southeast Alaska, mixed conifer stands usually consist of western hemlock, mountain hemlock, Alaska yellowcedar, Western redcedar, and Sitka spruce species. Shore pine may occasionally be present depending on individual sites.

### **Model**

A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has limits to its effectiveness, and is used as one of several tools to analyze a problem.

### **Monitoring**

A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for, to determine whether the mitigation measures were effective, or to validate whether overall goals and objectives were appropriate. Different levels call for different methods of monitoring.

### **Multiple-aged Stands**

An intermediate form of stand structure between even and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

### **Multiple Use**

The management of all the various renewable resources of the National Forest System to be used in the combination that will best met the needs of the American people.

### **Muskeg**

In Southeast Alaska, a type of bog that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

### **National Environmental Policy Act (NEPA) of 1969**

An Act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (The Principal Laws Relating to Forest Service Activities, Agricultural Handbook 453. USDA Forest Service, 359 pp.).

### **National Forest Management Act (NFMA)**

A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.

### **Native Selection**

Application by Native corporations and individuals to a portion of the USDI Bureau of Land Management for conveyance of lands withdrawn in fulfillment of Native entitlements established under ANSCA.

**Net Sawlog Volume**

Tree or log volume suitable in size and quality to be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as pulp or lumber.

**No-action Alternative**

The most likely condition expected to exist in the future if current management direction were to continue unchanged.

**Non-commercial Forest Land**

Land with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

**Non-commercial species**

Species that have no economic values at this time nor anticipated timber value within the near future.

**Non-Forest Land**

Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, etc.

**Notice of Intent (NOI)**

A notice printed in the Federal Register announcing that an Environmental Impact Statement will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information.

**Old Growth**

Ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of forest stand development that typically differ from earlier stages in a variety of characteristics which may include larger tree size, higher composition, and different ecosystem function. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

**Organic Soils**

Soils that contain a high percentage (generally greater than 20 to 30 percent) of organic matter throughout the soil depth.

**Parent Material**

The unconsolidated and partially-weathered material (or the C Horizon) from which upper layers of soil developed.

**Partial Cut**

Method of harvesting trees where any number of live stems are left standing in any of various spatial patterns. This does not include clearcutting. Can include seed tree, shelterwood, or other methods.

**Patch**

A non-linear surface area differing in appearance from its surroundings.

**Payments to States**

A fund consisting of approximately 25 percent of the gross annual timber receipts received by the National Forests in that State. This is returned to the State for use on roads and schools.

**Peak Flow**

The highest discharge of water recorded over a specified period of time at a given stream location. Often thought of in terms of spring snowmelt, summer, fall, or winter rainy season flows. Also called maximum flow.

**Planning Area**

The area of the National Forest System controlled by a decision document.

**Planning Record**

A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

**Plant Communities**

Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.

# 4 Lists

## **Population Viability**

Ability of a population to sustain itself.

## **Productive Old Growth (POG)**

Old-growth forest capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.

## **Public Participation**

Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service activities.

## **Record of Decision**

A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

## **Reforestation**

The natural or artificial restocking of an area with trees.

## **Regeneration**

The process of establishing a new crop of trees on previously-harvested land.

## **Regional Guide**

The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended. It guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands within a given region.

## **Resident Fish**

Fish that are not anadromous and that reside in freshwater on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

## **Responsible Official**

The Forest Service employee who has the delegated authority to make a specific decision.

## **Restoration**

The long-term placement of land back into its natural condition or state of productivity.

## **Revegetation**

The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseedling.

## **Riparian Area**

Area with distinctive resource values and characteristics that contain elements of aquatic and riparian ecosystems, which can be geographically delineated.

## **Riparian Ecosystem**

Land next to water where plants that are dependent on a perpetual source of water occur.

## **Roads**

*Specified:* Roads usually developed and operated for long-term land and resource management purposes to constant service.

*Temporary:* For National Forest timber sales, temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent Forest transportation network and have stream crossing structures removed, erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

## **Roadless Area**

An area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

**Rotation**

The planned number of years between the time that a forest stand is regenerated and its next cutting at a specified stage of maturity.

**RPA Assessment and Program**

The RPA Assessment is prepared every 10 years and describes the potential of the nation's forests and rangelands to provide a sustained flow of goods and services. The RPA Program is prepared every 5 years to chart the long-term course of Forest Service management of the National Forests, assistance to State and private landowners, and research. They are prepared in response to Sections 3 and 4 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) (16 U.S.C. 1601).

**Sawlog**

That portion of a tree that is suitable in size and quality for the production of dimension lumber collectively known as sawtimber.

**Scheduled Lands**

Land suitable and scheduled for timber production and which are in the land base for the calculation of the allowable sale quantity and long-term sustained yield timber capacity.

**Scheduled Timber Harvests**

Timber harvests done as part of meeting the allowable sale quality.

**Scrub-Shrub Wetland**

Wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.

**Scoping Process**

Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action, and the range of actions, alternatives, and impacts to be considered in an EA or an EIS.

**Second Growth**

Forest growth that has become established following some disturbance such as cutting, serious fire, or insect attack; even-aged stands that will grow back on a site after removal of the previous timber stand.

**Sediment**

Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

**Seed Tree**

Small number of seed-bearing trees left singly or in small groups after timber harvest to provide seed for regeneration of the site.

**Selective Cutting**

The annual or periodic removal of trees (particularly the mature), individually or in small groups from an uneven-aged forest to achieve the balance among diameter classes needed for sustained yields, and in order to realize the yield, and establish a new crop of irregular constitution. Note: The improvement of the forest is a primary consideration.

**Sensitive Species**

Plant and animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a non-official State list, or that are recognized by the Regional Forester as needing special management to prevent placement on Federal or State lists.

**Short-term Use**

Short-term uses, and their effects, are those that occur annually or within the first 10 years of project



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implementation.

### **Silviculture**

The science of controlling the establishment, composition, and growth of forests.

### **Smolt**

Young silvery-colored salmon or trout which move from freshwater streams to saltwater.

### **Snag**

A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height.

### **Soil Productivity**

The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

### **Spawning Area**

The available area in a stream course which is suitable for the deposition and incubation of salmon or trout eggs.

### **Split Yarding**

The process of separating the direction of timber harvest yarding into opposite directions.

### **Stand (Tree Stand)**

An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

### **Standard**

A course of action or level of attainment required by the modified 1997 Forest Plan to promote achievement of goals and objectives.

### **State Historic Preservation Officer (SHPO)**

State-appointed official who administers Federal and State programs for cultural resources.

### **Stocking**

The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

### **Stream Classes**

See Aquatic Habitat Management Unit.

### **Stream Order**

First-order streams are the smallest unbranched tributaries; second-order streams are initiated by the point where two first-order streams meet; third-order streams are initiated by the point where two second-order streams meet, and so on.

### **Structural Diversity**

The diversity of forest structure, both vertically and horizontally, which provides for a variety of forest habitats such as logs and multi-layered forest canopy for plants and animals.

### **Stumpage**

The value of timber as it stands uncut in terms of dollar value per thousand board feet.

### **Subsistence**

Section 803 of the Alaska National Interest Lands Conservation Act defines subsistence use as, "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

### **Subsistence Use Area**

Important Subsistence Use Areas include the "most reliable" and "most often hunted" categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADF&G, the University of

Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

**Substantive Comment**

A comment that provides factual information, professional opinion, or informed judgement germane to the action being proposed.

**Substrate**

The type of material in the bed (bottom) of rivers and streams.

**Succession**

The ecological progression of community change over time, characterized by displacements of species leading towards a stable climax community.

**Suitable**

Commercial forest land identified as having both the biological capability and availability to produce industrial wood products.

**Suitable Forest Land**

Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

**Suspended Sediment**

The very fine soil particles which remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

**Sustained Yield**

The amount of renewable resources that can be produced continuously at a given intensity of management.

**Tentatively Suitable Forest Land**

Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

**Thinning**

The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand or wildlife or other purposes. Thinning may be done at two different stages.

**Threatened Species**

Plant or animal species which is likely to become endangered throughout all or a significant portion of its range within the foreseeable future, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a Threatened Species. See also Endangered Species, Sensitive Species.

**Threshold**

The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

**Tiering**

Eliminating repetitive discussions of the same issue by incorporating by reference. The general discussion in an environmental impact statement of broader scope; e.g., this document is tiered to the Tongass Land and Resource Management Plan, as amended.

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### **Timber Appraisal**

Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

### **Timber Classification**

Forested land is classified under each of the land management alternatives according to how it relates to be management of the timber resource. The following are definitions of timber classifications used for this purpose.

*Nonforest:* Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

*Forest:* Land at least 10 percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

*Suitable or suitable available:* Land to be managed for timber production on a regulated basis.

*Unsuitable:* Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as inappropriate for timber production in the Forest planning process.

*Commercial forest:* Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

### **Timber Harvest Unit**

A "Timber Harvest Unit" is a portion of a timber sale within which Forest Service specifies for harvest all or part of the timber to meet the requirements of a timber sale contract.

### **Timber Stand Improvement (TSI)**

All noncommercial intermediate cutting and other treatments to improve composition, condition, and volume growth of a timber stand.

### **Tongass Land and Resource Management Plan (Forest Plan)**

The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the forest.

### **Turbidity**

An indicator of the amount of sediment suspended in water.

### **Unavoidable Adverse Effects**

Unavoidable adverse environmental effects are those that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of activities. The interdisciplinary procedure used to identify specific harvest units and roads is designed to eliminate or lessen significant adverse consequences. The application of Forest Plan Standards and Guidelines, Best Management Practices, project-specific mitigation measures, and monitoring are all intended to further limit the extent, severity, and duration of potential effects. Regardless of the use of these measures or the alternative selected, some adverse effects will occur.

### **Understory**

The trees and shrubs in a forest growing under the canopy or overstory.

### **Uneven-aged Management**

Forest management techniques which simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes.

### **Unscheduled Lands**

Lands suitable but not scheduled for timber production and which are not in the land base for the calculation of the allowable sale quantity nor long-term sustained yield timber capacity.

### **Unsuitable**

Forest land withdrawn from timber utilization by statute or administrative regulation; for example, Wilderness, or identified as not appropriate for timber production in the forest planning process.

### **Utility Logs**

Those logs that do not meet sawlog grade but are suitable for production of firm usable pulp chips.

### **Value Comparison Unit (VCU)**

Areas which generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

### **Viable Population**

The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

### **Viewshed**

An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

### **Visual Quality Objectives (VQO)**

Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:

*Preservation:* Permits ecological changes only. Applies to Wilderness areas and other special classified areas. Management activities are generally not allowed in this setting.

*Retention:* Provides for management activities that are not visually evident to the casual forest visitor.

*Partial Retention:* Management activities remain visually subordinate to the natural landscape.

*Modification:* Management activities may visually dominate the characteristics landscape. However, activities must borrow from naturally-established form-line color and texture so that the visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.

*Maximum Modification:* Management activities may dominate the landscape but should appear as a natural occurrence when viewed as background.

### **V-Notches**

A deeply incised valley along some waterways that would look like a "V" from a cross-section. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

### **Volume**

Stand volume based on standing net board feet per acre by Scribner Rule.

### **Volume Strata**

Categories of timber volume derived from the timber type data layer (TIMTYP) and the common land unit data layer (CLU). Three volume strata (low, medium, and high) are recognized in the Forest Plan.

*Low Strata:* The lowest range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the low volume class strata to contain approximately 13.9 MBF/Acre.

*Medium Strata:* The middle range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the medium volume class strata to contain approximately 23.3 MBF/Acre.

*High Strata:* The high range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the high volume class strata to contain approximately 29.9 MBF/Acre.

### **Watershed**

The area that contributes water to a drainage or stream. Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.



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### **Wetland**

Areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include: swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds. See the modified 1997 Forest Plan pp. 3-318 and 3-321 for detailed discussion on wetland type definitions.

### **Wilderness**

Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or a primitive and unconfined type of recreation; areas of at least 5,000 acres are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest. In Alaska, Wilderness has been designated by ANILCA and TTRA.

### **Wildlife Analysis Area (WAA)**

A division of land used by the Alaska Department of Fish and Game for wildlife analysis.

### **Wildlife Habitat**

The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

### **Windfirm**

Trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features.

### **Windthrow**

The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There generally are three types of windthrow:

*Endemic:* where individual trees are blown over;

*Catastrophic:* where a major windstorm can destroy hundreds of acres; and

*Management Related:* where the clearing of trees in an area make the adjacent standing trees vulnerable to windthrow.

### **Winter Range**

An area, usually at lower elevation, used by big game during the winter months; usually smaller and better-defined than summer ranges.

### **Yarding**

Hauling timber from the stump to a collection point.

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# **Appendix A**

**Reasons for Scheduling the  
Environmental Analysis of the  
Licking Creek Project Area  
Timber Sale**





# Appendix A

## Reasons for Scheduling the Environmental Analysis of Licking Creek Project Area Timber Sale

### Introduction

This Appendix provides a general explanation of the rationale for a specific timber sale project and its importance to the multi-year timber program on the Tongass National Forest. To accomplish this, the following questions are answered:

- Why is timber from the Tongass National Forest being offered for sale?
- What steps must be completed to prepare a sale for offer?
- How does the Forest Service develop expectations about the market demand for timber?
- How does the Forest Service maintain an orderly and predictable timber sale program?
- How does the Forest Service decide where timber sale projects should be located?
- How does this project fit into the Tongass timber program?
- Why can't this project be located somewhere else?

Coordinated timber sale planning is essential for meeting the goals of the Tongass Land Management Plan and to provide an orderly flow of timber to local industry. To determine the volume of timber to offer each year, the Forest Service can look to current market conditions and the level of industry operations. However, the lengthy planning process, of which this document is a part, requires the Forest Service to rely on projections of future harvest levels to decide how many timber sale projects to begin each year. This document explains how the Forest Service uses information about future markets and past experience with the logistics of timber sale planning to determine the volume of timber that needs to be started through this process each year. Using a detailed timber sale schedule that provides information about each sale as it moves through each stage of the planning process, this Appendix explains the rationale and the necessity for completing this particular timber sale project at this point in time.

### Why is Timber from the Tongass National Forest Being Offered for Sale?

#### National Legislation

On a national level, the legislative record is very clear about the role of the timber program in the multiple-use mandate of the national forests. The Organic Act of 1897, 16 USC 473-481 (partially repealed in 1976) directed the agency to manage the forests in order to "improve and protect the forest ... [and] for the purpose of securing favorable conditions of water flows, and

to furnish a continuous supply of timber for the use and necessities of the citizens of the United States" (emphasis added.) The Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. 528-531, directs the Forest Service to administer federal lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes."

The National Forest Management Act of 1976 (16 U.S.C. 472a) states that "the Secretary of Agriculture...[may sell, at not less than appraised value, trees, portions of trees, or forest products located on National Forest System Lands]." Although the heart of the Act is land management planning, the Act also sets policy direction for timber management and public participation in Forest Service decision making. Under NFMA, the Forest Service was directed to "limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis" (16 U.S.C. 1611).

The NFMA directed the Forest Service to complete land management plans for all units of the National Forest System. Forest Plans were to be developed by an interdisciplinary team to provide for the coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness.

### Alaska-Specific Legislation

Legislation unique to Alaska also directs the Forest Service to maintain a commercial timber program. The Alaska National Interest Lands Conservation Act (ANILCA; P.L. 96-487, 1980) and the Tongass Timber Reform Act (TTRA; P.L. 101-625, 1990) speak directly to the issue of Tongass timber supply. Section 705(a) of ANILCA directed the Forest Service to maintain a timber supply from the Tongass at a rate of 4.5 billion board feet per decade. To ensure that the timber target was met, Congress provided for a \$40 million annual earmark to fund pre-roading, cultural treatments and innovated logging systems.

Section 101 of TTRA repealed the timber supply mandate and fixed appropriations of ANILCA and replaced them with the following more general direction:

Sec. 705. (a), Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the annual market demand from such forest for each planning cycle.

Timber from the Tongass National Forest is being offered as part of the multiple use mission of the Forest Service as identified in public laws. Alaska-specific legislation and the Forest Plan directs the Forest Service to seek to provide timber to meet market demand subject to appropriations and balancing of forest uses.

### Tongass Forest Plan

The 1979 *Tongass National Forest Land and Resource Management Plan* was the first Forest Plan to be completed. A revised Forest Plan was issued in 1997 and modified in 1999. Subsequently, Alaska Federal Court Judge James K. Singleton vacated the 1999 TLMP ROD in a March 30, 2001 court decision. With regard to timber production, the Record of Decision for the 1997 Plan states:

"The Tongass National Forest will continue timber harvest consistent with sustained yield and multiple use goals... Although the maximum amount of timber that could be harvested during the first decade of the Revised Plan implementation is an average of 267 MMBF per year, a level of 200 MMBF or less is more likely to be offered over the next few years, given current market conditions and the transition that both the timber industry and the Forest Service is experiencing. Therefore the public can expect the amount of timber to be offered annually to vary between 200 MMBF or less and 267 MMBF.

...The timber resource will be managed for production of sawtimber and other wood products from timberlands available for sustainable timber harvest, on an even-flow,

sustained-yield basis and in an economically efficient manner. We will seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle...

The Tongass National Forest will continue to allow timber harvest while maintaining sustained yield and multiple use goals. The forest-wide standards and guidelines for timber include general direction to "[e]nsure that silvicultural systems other than clearcutting are considered through an appropriate project level analysis process. However, uneven-aged management systems will be limited to areas where yarding equipment suited to selective logging can be used..."

Forest-wide, considering all land allocations where timber harvest is permitted, it is estimated that 65 percent of harvesting will involve clearcutting, with the remaining 35 percent utilizing other methods."

In the day to day operation of the Tongass timber program, the Forest Service attempts to strike a balance among timber availability as documented in the Forest Plan, the market demand for timber in Southeast Alaska, the needs and desires of other forest users, and funding allocations made by Congress.

## **What Steps Must Be Completed to Prepare a Sale for Offer?**

The timber sale program is complex. A number of projects are underway at any given point in time, each of which may be in a different stage of planning and preparation. A system of checkpoints, or "gates", helps the Forest Service track the significant milestones of each project from inception to contract termination. Each project passes through all of the following gates, with the complexity of the sale determining the complexity of the final product at each stage.

### **Gate 1 - Completion of Position Statement**

The Position Statement is a brief analysis of the project area with the intent of determining the feasibility of the potential timber sale. This is the first step in the timber sale planning process and it is usually completed from seven to ten years before a sale is offered. After the Position Statement is developed, the Forest Service decides whether to continue to the next phase of the project where a significant investment in time and money will be made.

### **Gate 2 – Sale Area Design, Environmental Documentation, and Decision**

This phase of the project is commonly referred to as the "NEPA" phase and includes inventory, public scoping, analysis, draft disclosure of the effects of the project on the environment, public comment, final analysis and disclosure, decision, potential appeal, and litigation. Gate 2 activities are generally completed two to six years before a sale is offered. The end product of this phase, an environmental decision document, forms the starting point for the next phase.

### **Gate 3 – Plan Implementation and Field Layout**

Gate 3 activities are typically completed one to three years before a sale is offered. During this phase, the information and direction included in the decision document (Gate 2) is used to designate the actual project on the ground. Additional site-specific information is collected at this time.

### **Gate 4 – Appraisal Offering Package**

The costs and value associated with the timber sale designed in Gate 3 are computed and packaged in a timber sale contract. The contract tells the prospective timber sale purchaser how the sale must be harvested to be in conformance to the project decision document. This phase of the Gate system occurs during the final year of the project development and culminates with the advertisement of the project for sale.



## Gate 5 – Bid Opening

Gate 5 is completed with the opening of bids for the project. If a bid is submitted, contractual provisions govern when the award of the sale takes place and when the sale will be completed and how timber removal is to occur.

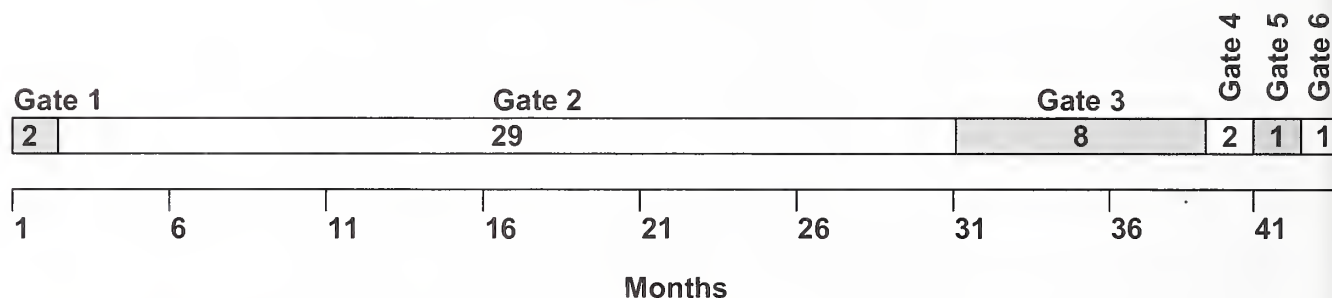
## Gate 6 - Award

Gate 6 is the formal designation of a contract between a bidder and the Forest Service.

Figure A-1

Average Timeline for the Gate System

### Average Timeline for the Gate System through Award \*



Gate 1 – Completion of Position Statement

Gate 2 – Sale Area Design, Environmental Documentation and Decision

Gate 3 – Plan Implementation and Field Layout

Gate 4 – Appraisal Offering Package

Gate 5 – Bid Opening

Gate 6 – Award

\* After a sale is awarded, it is under contract from one to three years depending on size.

\* Source: Geneen Granger, Alaska Regional Office unpublished data, Average time for Gate 2 EIS document.

## How does the Forest Service Develop Expectations about Future Timber Markets?

The Tongass National Forest makes two determinations on volume to be offered. The first is a determination on volume to be offered for the current year (annual market demand). The annual market demand is analogous to assessing industry performance in the short-term. In the short-run a firm will make use of its existing equipment to maximize profits or minimize losses. The general approach is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capability. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. Timber inventory requirements are acknowledged and estimated in a related calculation. The volume of timber likely to be purchased is equal to the volume needed to make up any inventory shortfall in addition to the volume likely to be harvested in the coming year. The document titled *Evaluating the Demand for Tongass Timber* (USDA, Forest Service, R-10; Morse; September 28, 1998) forms the basis for how these estimates were developed. The document titled *Tongass National Forest Timber Sale Procedures* (USDA, Forest Service, R-10; Morse, October 2000) documents actual estimates for the current year. This estimate is what the Tongass plans to offer for the current year of the Ten Year Timber Sale Schedule pending sufficient funding to do so. Final procedures can be located in the document titled: *Responding to the Market Demand for Tongass Timber* (USDA, Forest Service, R-10-MB-413, Morse, April 2000).

## Life of the Forest Plan (Market Demand over the Planning Cycle)

Based on the analysis documented in the *Tongass Timber Sale Procedures*, for Fiscal Year 2002, the Tongass National Forest offering required to meet timber supply objectives is 132 MMBF. The offer planned will be a combination of new, previously offered, or previously offered and reconfigured timber sales. Both standing timber and salvage will be components of the program. Offerings will consist of those targeted for Small Business qualified firms as well as a portion of the volume being made available for the open market.

Given the long time involved in preparing a timber sale, the proposed timber sales in this document may not be harvested for 3 to 4 years or longer, not including appeals or litigation. The Forest Service needs some idea of what the long-term timber demand will be given cycles in the market. On average, what should the Forest Service plan for offer, given that timber from this NEPA document may not be harvested for 4 years into the future? The Forest Service needs to take a long-term view for planning purposes. To answer these questions, the Forest Service asked the Pacific Northwest Research Station for professional assistance.

As the Tongass Land Management Plan was being revised in 1997, research economists at the Pacific Northwest Research Station (PNW) were asked to update their earlier projections of Alaska timber products output and timber harvest by ownership. The most recent projections of timber harvest over the planning cycle account for several dramatic changes in the region's manufacturing capabilities, increased competition from a number of sources, and the steady erosion of North America's share of Japanese timber markets.

The Forest Service documents these projections and the means of implementation through the issuance of a Ten Year Timber Sale Schedule. Each year this plan is updated whereby the current year is dropped at the culmination of the fiscal year and a new year ten is added. The basis for this schedule is long-range timber market projections documented in the publication titled *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes; PNW-GTR-409, September, 1997). These projections of Alaska timber products output, the derived demand for raw material, and timber harvest by owner are developed from a trend-based analysis. These projections reflect the consequences of recent changes in the Alaska forest sector and long-term trends in markets for Alaska products. With the closure of the two Southeast Alaska pulp mills, demand for Alaska National Forest timber now depends on markets for sawn wood and the ability to export manufacturing residues and lower grade logs. Three alternative projections are used to display a range of possible future demand (Table A-1). Areas of uncertainty include the prospect of continuing changes in markets and in conditions faced by competitors and the speed and magnitude in investment in manufacturing in Alaska.

Demand projections are important for program planning. They provide important guidance to the Forest Service for requesting budgets, for making decisions about workforce and facilities, and for indicating the need to begin new NEPA analysis for future program offerings. They also provide a basis for expectations regarding future harvest, and thus provide an important source of information for establishing the schedule of probable future sale offerings. The weight given to the projections will vary depending on a number of factors, such as how recently they were done, and how well they appear to have accounted for recent, site-specific events in the timber market.

Table A-1  
Projected National Forest Harvest<sup>1</sup>

Fiscal Year	Projected Harvest (MMBF)			Actual
	Low	Medium	High	
1998	77.3	86.0	112.2	119.8
1999	86.4	99.3	127.9	145.8
2000	95.5	115.9	142.7	146.8
2001	104.6	129.0	157.7	47.8 <sup>2</sup>
2002	113.7	134.9	173.1	29.6 <sup>3</sup>
2003	122.8	140.8	188.9	
2004	131.9	146.5	205.0	
2005	131.9	152.2	221.4	
2006	131.9	157.8	238.2	
2007	132.0	163.4	255.3	
2008	132.0	168.9	272.8	
2009	132.1	174.3	290.7	
<b>Average</b>	<b>112.8</b>	<b>132.6</b>	<b>182.2</b>	<b>98</b>
<b>Mean</b>		<b>168.7</b>		

<sup>1</sup> For Fiscal Years 2003-2009, the Tongass National Forest plans to schedule approximately 160 MMBF for sale each year over the life of the Forest Plan. This schedule is based on the projections documented in *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes; PNW-GTR-409, September, 1997), and current volumes in the timber sale pipeline process. Prior to the beginning of each fiscal year the amount of volume to be scheduled in that fiscal year is once again analyzed to determine if the projection meets the anticipated need.

<sup>2</sup> Truncated logging season due to Judge James K. Singleton's TLMP Appeal Decision, March 30, 2001.

<sup>3</sup> Tongass volume harvested as of August 31, 2002.

## How does the Forest Service Maintain an Orderly and Predictable Timber Sale Program?

### Pools of Timber (Pipeline Volume)

As discussed earlier, the Forest Service tracks accomplishment of various stages of development of each timber sale with the Gate System process. From a timber sale program standpoint, it is also necessary to track and manage multiple projects through time as projects collectively move through the Gate System. Tracking of the multiple projects can be likened to following various segments of several projects through a pipeline of time. Because of the relatively long timeframes needed to accomplish a given timber sale and the complexities inherent in timber sale project and program development, it is necessary to track various timber sale program volumes from Gate 1 through Gate 6. Gate 1 volume represents a large pool of program volume, but represents a relatively low investment from project to project. This relative investment level offers the timber program manager a higher degree of flexibility and thus, does not greatly influence the flow of volume through the pipeline. In addition, tracking of how much volume near the end of the pipeline that is in appeals or litigation may be necessary to determine potential effects on the flow of potential timber sales.



The goal of the Tongass National Forest is to provide an even flow of timber sale offerings on a sustained yield basis. In past years, this has been difficult to accomplish due to continual reductions in the suitable timberland base, reductions in the timber industry processing capabilities, rapid market fluctuations and Forest Plan modifications and litigation. To achieve an even flow of timber sale offerings, 'pools' of projects in various stages of the Gate System will be maintained so volume offered can be balanced against current year demand and market cycle projections. Today, upward trends in demand are reacted to by moving outyear timber projects forward leaving outyears not capable of meeting the needs of the industry. In other instances, a number of new projects are started based on today's market but not available for a number of years. By the time the added projects are ready for offer, the market and demand for this volume has changed. Three pools are being tracked to achieve an even flow of timber sale offerings:

- **Timber volume under analysis (Gate 2):** Timber volume under analysis contains sales being analyzed and undergoing public comment through the NEPA process. This process can often take from one to five years and reaches a significant milestone when a NEPA decision is made. This pool includes any project with a formal Notice of Intent through those with a decision document issued. Volume in appeals and litigation will be tracked as a subset of this pool as necessary.
- **Timber volume available for sale (Gate 3, Gate 4 and Gate 5):** Timber volume available for sale contains sales for which environmental analysis has been completed, and administrative appeals, and litigation (if any) have been resolved. They have also been fully prepared, and are available to managers to schedule for sale offerings. Managers need to maintain enough volume in this pool to be able to schedule future sale offerings in an orderly manner of the size and configuration that best meets the need of the public. As a matter of policy, and sound business practice, the Forest Service attempts to announce probable future sale offerings at least one year in advance. This allows potential purchasers an opportunity to do their own evaluations of these offerings in order to determine whether to bid, and if so, at what level.
- **Timber volume under contract (Gate 6):** Timber volume under contract contains sales that have been sold and a contract awarded to a purchaser, but has not yet been fully harvested. Timber contracts typically, but not always, give the purchaser three years to harvest and remove the timber purchased. Long standing Forest Service practice is to attempt to maintain about two to three years of unharvested timber volume under contract to timber purchasers. This volume of timber is the industry's dependable timber supply, which allows immediate flexibility in business decisions. This practice is not limited to the Alaska Region, but is particularly pertinent to Alaska because of the nature of the land base. The relative absence of roads, the island geography, the steep terrain, and the consequent isolation of much of the timber land means that timber purchasers need longer-than-average lead times to plan operations, stage equipment, set up camps, and construct roads prior to beginning harvest.

What drives the various timber sale program pipeline pool volume is a combination of actual harvest and projected demand. As purchasers harvest timber, they deplete the volume under contract. Managers track harvest, and offer sales that give the industry as a whole the opportunity to replace this volume and build or maintain their working inventory. Although there can be significant variation for practical reasons from year to year, in the long-run, over both the high points and low points of the market cycle, timber harvest will equal timber sales.

The Forest Service, based on historical patterns, determines the amount of pipeline volume in each of the pools. Table A-2 displays volume levels that are expected to be maintained in each pool.



- Pool 1, Timber Volume Under Analysis, is expected to be maintained at approximately 4.5 times the amount of anticipated harvest.
- Pool 2, Timber Volume Available for Sale, is expected to be maintained at approximately 1.3 times the amount of anticipated harvest.
- Pool 3, Volume Under Contract, is expected to be maintained at approximately 3 times the amount of anticipated harvest.

The objective of the pools concept is to maintain sufficient volume in preparation and under contract to be able to respond to yearly fluctuations in a timely manner.

Table A-2  
Pipeline Pool Matrix

Pipeline Pool Volume	Flows	End of FY 02	Planned During FY 03	End of FY 03
1. Volume Under Analysis <sup>1</sup> (Gate 2) (MMBF) (4.5 times expected harvest)		413 <sup>2</sup>	562 <sup>3</sup>	293 <sup>3</sup>
	NEPA Cleared	108 <sup>3</sup>	319 <sup>3</sup>	276 <sup>3</sup>
2. Volume Available for Sale <sup>4</sup> (Gate 3, Gate 4 and Gate 5) (MMBF) (1.3 times expected harvest)				
	Offered		151 <sup>5</sup>	
	Sold		123 <sup>5</sup>	
3. Volume Under Contract <sup>6</sup> (Gate 6) (MMBF) (3.0 times expected harvest)		196 <sup>7</sup>		369 <sup>8</sup>
	Volume Harvested*		123 <sup>9</sup>	

Matrix crosswalk between Gate Tracking System and Pools of Timber Concept:

<sup>1</sup>Gate 2: Decision document that is viable for sale after completion of appeals and litigation.

<sup>2</sup>Actual figure from Tongass National Forest Schedule of Proposed Actions.

<sup>3</sup>Estimated figure.

<sup>4</sup>NEPA cleared timber volume: Gate 3, field preparation work; Gate 4, timber sale contract package preparation; Gate 5, Timber Sale bid opening.

<sup>5</sup>Tongass National Forest Timber Sale Procedures, Morse, October 2000, Table page 4, updated August 2003 by William Wilson, Regional Office, Forest Management Planning Group Leader.

<sup>6</sup>Gate 6: Timber sale award and contract execution, based on the Timber Sale Statement of Accounts.

<sup>7</sup>Volume under contract as of June 30 2002. Assumes the following: GFP Sawmill (50MMBF) and Metlakatla Sawmills (95 MMBF) removed from capacity estimate. Estimate of uneconomic timber sales eligible for cancellation removed from VUC (70MMBF). Sales not available due to Judge Singleton's injunction removed from VUC (65MMBF).

<sup>8</sup>Three times the amount of volume projected in the LOW market scenario given in Timber Output and Timber Harvests in Alaska: Projection for 1997 – 2010, Gen. Tech. Report. PNW-GTR-409, Portland, Oregon, USDA Forest Service, PNW Research Station.

<sup>9</sup>Projected harvest for FY 2003, from the PNW Research Station using the LOW market scenario (see #8 above).

\*Note-The amount of volume estimated to be harvested for the year sets the basis for what will be maintained in Pools 1-3 (Gates 2 through 6). Should this estimate be incorrect, adjustments can be made in the following years without significant departures in outyear program capabilities.

Table A-3. Timber Volume in Appeals and/or Litigation

Timber volume in appeals and/or enjoined in litigation *	50.6 Million Board Feet
--	-------------------------

\*As of 10/01/02. This figure does not include those environmental documents on hold due to Judge Singleton's March 30, 2001 court ruling.

## How Does the Forest Service Decide Where Timber Sale Projects Should be Located?

### The Allowable Sale Quantity (ASQ)

The 1997 Forest Plan Record of Decision established an ASQ for timber at 2.67 billion board feet per decade, which equates to an annual average of 267 million board feet (MMBF). The ASQ serves as an upper limit on the amount of timber that may be offered for sale as part of the regularly scheduled timber sale program. It consists of two separate Non-Interchangeable Components (NICs) called NIC I, which is 2.2 billion board feet of timber per decade, and NIC II, which is .47 billion board feet per decade. There are two purposes of partitioning the ASQ into two components:

- 1) to maintain the economic sustainability of the timber resource by preventing the over-harvest of the best operable ground and
- 2) to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions.

The NIC I component includes lands that can be harvested with normal logging systems. The NIC II component includes land that has high logging costs due to isolation or special equipment requirements. Most of these NIC II lands are presently considered economically and technically marginal.

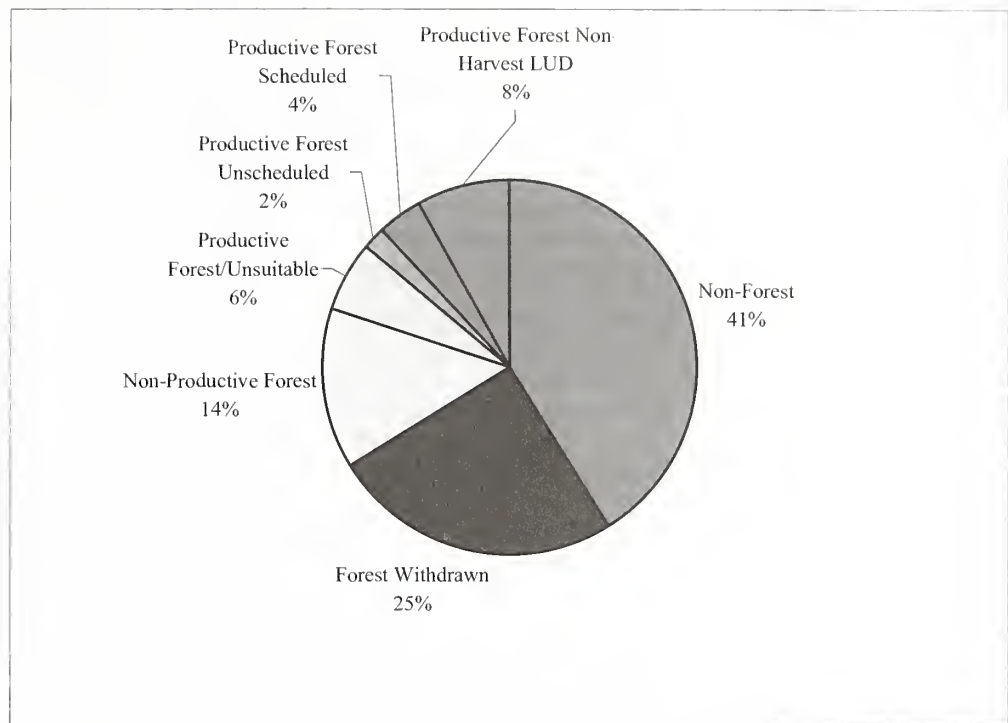
The Tongass National Forest has been unified under one Forest Supervisor. For planning and scheduling purposes, the allowable sale quantity is distributed by Ranger District. Each District has been allocated a portion of the timber harvest program based on the FORPLAN computer run and availability of suitable and available acres, to implement the Forest Plan, and Section 101 of the Tongass Timber Reform Act (1990). The Forest Plan set the Forest-wide allowable sale quantity (ASQ) upper limit at 267 MMBF per year. The distribution of the planned ASQ harvest among the Districts is listed in Table A-4 (all volumes are identified as sawlog plus utility).

Historically, timber harvest has been spread across the Tongass National Forest with the long-term timber sales and mills located in Sitka and Ketchikan. The suitable timber land base is spread across the Forest as displayed in Figure A-2. In answer to the question presented for this section of the Appendix, the suitable timber base is capable of producing the ASQ documented in the 1997 Forest Plan Record of Decision.

Table A-4  
Distribution of ASQ Among the Tongass National Forest Ranger Districts

Tongass National Forest Ranger District	Non-Interchangeable Components	
	NIC I	NIC II
Ketchikan	32	7
Thorne Bay	42	9
Craig	33	7
Wrangell	28	6
Petersburg	50	9
Sitka	17	4
Hoonah	7	2
Juneau	7	2
Yakutat	4	1
Admiralty	0	0
<b>NIC Totals</b>	<b>220</b>	<b>47</b>
<b>ASQ Total (MMBF)</b>	<b>267</b>	

Figure A-2  
1997 Forest Plan Timber Resource Suitability Analysis



This chart depicts the productive suitable land base that is scheduled for timber harvest activities. Four percent of the Tongass land base generates the allowable sale quantity of 267 MMBF per year. The remainder of the land, approximately 96 percent, is not scheduled, does not allow or will not support timber harvest activities.

Non-Forest – Land that has never supported forests, eg. muskeg, rock, ice, etc.

Forest Withdrawn – Forest lands designated by Congress, the Sec. of Agriculture, or Chief for purposes that preclude timber harvest are classified as unsuitable, eg. LUD Congressionally Designated Roadless Areas.

Non-productive Forest – Forest land not capable of producing crops of wood.

Productive, Non-harvest LUD – Productive forest lands that are not suited for timber production due to Forest Plan land use designation eg. Semi-Remote Recreation, Old-growth Habitat, etc.

Productive Forest Unsuitable – Forest land unsuitable for timber due to physical attributes (steep slopes) and/or inadequate information to insure restocking trees (soils).

Productive Forest Scheduled – Forest land scheduled over the rotation available for timber harvest.

Productive Forest Unscheduled – Forest land that meets all the criteria for timber production availability but not scheduled for harvest over the rotation.

Source: Appendix A, 1997 Forest Plan

## District-Level Planning

The Forest Supervisor for the Tongass National Forest has discrete responsibilities for the overall management of the Forest's timber sale program. Included within these responsibilities is making the determination on the amount of timber volume to be made available to industry, as described above. Once a determination is made for the current year (annual demand) offer level, the information is presented to Congress via the Regional Forester and Chief of the Forest Service. Whether or not funding is appropriated to attain the program is the responsibility of the Congress and the President of the United States.



While the debate on funding takes place, the Tongass Forest Supervisor directs the District Rangers to formulate timber sale schedules that attain the prescribed offer level for the current year as well as develop outyear timber programs based on projected market demand for the planning cycle. It is the Ranger's role to recommend to the Forest Supervisor timber sale projects that meet Forest Plan goals and objectives. Districts work on various projects simultaneously resulting in continual movement of projects through the stages of the timber program pipeline. Their schedule allows the necessary time to complete preliminary analysis, resource inventories, environmental documentation, field layout preparations and permit acquisition, appraisal of timber resource values, advertisement of sale characteristics for potential bidders, bid opening, and physical award of the timber sale. Once all of the Rangers' recommendations are made and compiled into a consolidated schedule, the Forest Supervisor is responsible for the review and approval of the final plan.

Pending Congressional appropriations, the sale schedule is implemented. In the event insufficient funds are appropriated to achieve the desired outputs, timber sale projects are selected and implemented on a priority basis. Generally, the higher priority projects include sales where investments such as road networks, camps or log transfer facilities have already been established. Those sales that are not implemented or only partially implemented are moved to the outyear. The sale schedule becomes very dynamic in nature due to the number of influences on each of the districts. A formal review of the schedule is done annually by the Forest Supervisor in consultation with the District Rangers, and amendments are made as needed through the course of the year. (The Tongass Timber Sale Plan is located on the Tongass National Forest Website, [www.fs.fed.us/r10/tongass/](http://www.fs.fed.us/r10/tongass/)).

The National Forest Management Act requires the Forest Service to develop timber sale schedules that encompass the life of the Forest Plan. The recent Tongass National Forest Planning process culminated in issuance of the *Forest Plan Record of Decision for the Tongass Land and Resource Management Plan*. In response to this Plan, the Tongass has prepared a Ten Year Timber Sale Schedule for Fiscal Years 2002-2012. The Fiscal Year 2003 offer level is based on annual market demand estimates. The remaining years, 2003-2011, are based on market demand projections over the planning cycle. Table A-5 denotes the first year of the ten-year plan. Fiscal Year 2003 is listed below to show the reader an example of the information available and display the timber sales scheduled for the current fiscal year.

Table A-5  
Tongass Ten Year Timber Sale Schedule-Fiscal Year 2003

NEPA Project	Decision Date	RD	Sale Name	Vol S+U (MMBF)	Class	FY03 Gate 3	FY03 Gate 5
Licking Creek		KMRD	Licking Creek	16.8	S	12.0	12.0
Licking Creek		KMRD	Licking Creek South	4.8	S	4.8	4.8
Boundary (H.L.)		KMRD	Boundary	3.0	S	3.0	3.0
Mop Pt/91 Knot		KMRD	91-Knot Reoffer	0.5	S	0.5	0.5
Cholmondeley		CRD	Dr. Point	16.0	S	16.0	16.0
Cholmondeley		CRD	Skowl	7.0	S	7.0	7.0
Craig Small Sales		CRD	Various Small Sales	0.5	S	0.5	0.5
Cholmondeley		CRD	Sunny (FY99 Sale)	7.0	S	7.0	7.0
Cholmondeley		CRD	Cher (FY99 Sale)	5.0	S	5.0	5.0
Chasina EIS		CRD	Johnston Mtn. (FY01 Sale)	5.9	S	0.5	5.9
TNB Small Sales EA		TNB	Various Small Sales	3.0	S	3.0	3.0
Roadside EA	Dec 02	TNB	Small Sales	2.0	S	2.0	2.0
Roadside EA	Dec 02	TNB	Small Sales	2.0	S	2.0	2.0
Lab Bay EIS	Jan 97	TNB	Thorne Island	3.5	S	0.5	3.5
Luck Lake	Jun 00	TNB	Luck Lake (FY 00)		O		8.0
Control Lake EIS	May 98	TNB	Mad Rush (FY 01)		O		5.3
Heceta Second Growth		TNB	Heceta CT	8.0	S	8.0	8.0
Couverden		JRD	Homeshore	25.0	S	15.0	15.0
HRD Small Sales		HRD	Small Sales	0.4	S	0.4	0.4
Yakutat Salvage EA		YRD	Yakutat Salvage	10.0	S	10.0	10.0
Scott Peak EIS		PRD	Sherman Peak	12.0	S	8.0	8.0
Woodpecker	Proposal	PRD	Woodbine (Unit 187)	0.1	S	0.1	0.1
Woodpecker	Proposal	PRD	Woodchuck (Unit 161A)	0.2	S	0.2	0.2
Twin Creek EA		PRD	Frenchy 99		S		1.0
South Lindenberg EIS	Dec 96	PRD	Redo		S	5.0	5.0
Threemile		PRD	Threemile	20.0	S	20.0	20.0
South Lindenberg	Dec 96	PRD	Short Run		S	1.0	1.0
Doughnut EA	Apr 00	WRD	Doughnut		S		3.4
Skipping Cow	Apr 00	WRD	Skipping Cow		S		31.0

\* These NEPA documents are in progress and may or may not have an action alternative selected. Volumes displayed are for planning purposes only and do not constitute a decision.

The Ten Year Schedule provides a significant amount of information and is described as follows:

**NEPA Project:** Environmental document project name. This name may or may not differ from the timber sale project name depending on how many sales originate from the original NEPA document.

**Decision Date:** The date of the decision document, whether planned or actual. "X" denotes project has started and completion is within the Fiscal Year but a specific date (e.g. month) is not firm.

**RD:** Ranger district office where project is located (PRD=Petersburg Ranger District).

**Sale Name:** Timber sale project name. FY00 or FY01 designates that this timber sale was originally planned to be sold in fiscal year 2000 or 2001, but due to late NEPA decisions, personnel going to lower 48 states' fires, and other delays caused the timber sale to be advertised late and sold early in FY 2001. The timber sale may also have been advertised and unsold and the sale is now planned to be reoffered.

**Vol S+U (MMBF):** Possible timber volume (sawlog plus utility) that could result if an action alternative is selected from the NEPA document. Generally only appears once in the year the decision is made. If no volume is shown, decision on document was made in another fiscal year.

**Class:** Timber sale size class determination (S-SBA, O=open sale to all bidders).

**FY02 Gate 3 (Layout):** Only appears in fiscal year sale is to be laid out and appraised. May appear in more than one year.

**FY02 Gate 5 (Offer):** Only appears in fiscal year sale is to be offered. Number designates potential volume.

The location of timber sale projects are based on the land allocation directed in the Forest Plan decision. Timber sales are located where permitted based on the prescription and objectives of the land use designation. Timber sale projects are located to varying degrees in land use designations identified as Timber Production, Modified Landscape, and Scenic Viewshed.

As stated earlier, the District Ranger is responsible for identifying and recommending the project areas for the Ten Year Timber Sale Schedule. The considerations the Ranger makes on each project includes but are not limited to the following:

- The project area contains a sufficient number of acres allocated to development land use designations to make timber harvest in the area appropriate under the Forest Plan. There is an adequate amount of suitable and available land for timber harvest opportunities. Available information indicates harvest of the amount of timber volume being considered for this project can occur consistent with the Forest Plan standards and guidelines and other resource protection requirements.
- The project and proposed timber harvest volume can contribute to achieving the goals and objectives of implementing the Forest Plan.
- The potential investment in infrastructure (roads, bridges, log transfer facilities, camps, rock pits, etc.) is necessary for sustainable timber harvest offerings. Where infrastructure already exists, this project will enable maintenance and upgrade of the facilities, which is necessary for removal of timber volume.
- The potential effects on subsistence and other resources.
- Based on current year and anticipated outyear timber volume demand; volume currently under contract; anticipated Congressional allocations; and the availability of resources to fully prepare and offer this project for sale, this project is consistent with and meets all laws and regulations. These laws and regulations include Forest Service Policy in the Alaska Region Regional Guide; Best Management Practices; the 1997 *Tongass Land and Resource Management Plan FEIS and ROD*; and all other laws and regulations governing the removal of timber from National Forest System lands.

## How Does This Project Fit into the Tongass Timber Program?

The Licking Creek project is proposed for offer beginning in Fiscal Year 2003 (Tongass National Forest Ten Year Timber Sale Schedule, approved by Thomas Puchlerz, Forest Supervisor, September 30, 2002). Forest-wide, total offer volume being planned for Fiscal Year 2003 is approximately 151 MMBF. In order to achieve the planned offer date, the Licking Creek project has a proposed Gate 2 completion date of Fiscal Year 2003 with Gate 3 implementation to begin in Fiscal Year 2003.

The Licking Creek project is currently in Gate 2, "Volume Under Analysis." The project's action alternatives being addressed in the NEPA analysis range from approximately 5.4 MMBF to 16.8 MMBF that could contribute to the Tongass Timber Sale Program. As described earlier, the volume of timber needed to maintain this Pool is 413 MMBF. Currently, forest-wide, Pool 1 contains from 210 MMBF to 307 MMBF inclusive of this project. Therefore, the Licking Creek project is consistent with program planning objectives and necessary to meet the goal of providing an orderly flow of timber from the Tongass on a sustained yield basis. Given the included information, it is reasonable to be conducting the environmental analysis for this project at this time.

## Why Can't This Project Occur Somewhere Else?

As previously discussed, the market demand for timber for the next 10 years is expected to average 168.7 MMBF per year. The suitable and available land base on the Tongass is capable of supporting an Allowable Sale Quantity of 267 MMBF annually, 220 MMBF of which is considered economical (i.e. the NIC I component). Based on the projected market demand for the planning cycle, all suitable timberlands will eventually be scheduled for harvest to meet the current and projected demand for raw material in Southeast Alaska. The relocation of this project to another area is inefficient and potentially contrary to the standards and guidelines of the Forest Plan. This decision is based on the cumulative impact on other resources from past harvest activities, the location of timber sales under contract, and the eventual use of all suitable lands for timber sale projects.

- Areas with available timber will be necessary to consider for harvest in order to seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle, pursuant to Section 101 of the Tongass Timber Reform Act (TTRA).
- The potential effects on subsistence resources are projected to differ little based on the sequence these areas are harvested. Harvesting other areas with available timber on the Tongass National Forest is expected to have similar potential effects on resources, including those used for subsistence, because of widespread distribution of subsistence use and other factors. Harvest within other areas is foreseeable, in any case over the forest-planning horizon under the Forest Plan.
- Providing substantially less timber volume than required to meet Forest Plan and TTRA Section 101 timber supply and employment objectives in order to avoid harvest in the project area is not necessary or reasonable.
- It is reasonable to schedule harvest in the project area rather than in other areas at the present time based on previous harvest entry and access, level of controversy over subsistence and other effects, the ability to complete the National Environmental Policy Act (NEPA) process and make timber available to meet the needs of dependent industries. Other areas that are reasonable to consider for harvest in the near future are



the subjects of other project EISs that are currently ongoing or scheduled to begin soon.

# **Appendix B**

## **Unit and Road Cards**



# Appendix B

## Unit Cards and Road Cards

The unit cards and road cards in this appendix are used to explain site-specific information about each unit and road segment and any resource concerns and mitigation.

The first half of this appendix displays narrative cards and maps for the proposed harvest units, in numerical order. Each narrative card and accompanying map displays the site-specific silvicultural prescriptions, resource concerns, and mitigation for the unit. The second section displays narrative cards and maps for the proposed roads, which include the management objectives for each segment of road. The road cards are also in numerical order.

Please note that each harvest unit or road may occur in one or more alternatives, and that the alternatives are listed both on the narrative card and the map. For a comprehensive picture of the proposed units and roads for each alternative, refer to the alternative maps in Chapter 2.

The following section is background information for the unit and road cards. This includes more detailed resource information, and the mitigation measures that can be used to address resource concerns. These mitigation measures can be either from the Forest Plan or project-specific.

## Resource Information

### Silvicultural Prescriptions

Silvicultural prescriptions have been developed to meet the management objectives based on each site and the Forest Plan direction. These objectives may include retaining old-growth characteristics for biodiversity, protection of soils, watershed, wildlife habitat or scenery values or designing systems that are most economical for logging feasibility on a site.

Silvicultural prescriptions will include these unit cards as well as sale layout and marking guidelines for each unit that is included in the Licking Creek Timber Sale Record of Decision. Minor changes to boundary layout and to the prescriptions are expected during implementation to better meet on-site conditions. The harvest treatment descriptions on the unit cards are basic guidelines to achieve the desired stand structure and logging system operability, and address resource concerns. Silvicultural systems and some of the prescriptions that may achieve the desired results are described below:

- **Uneven-aged Management:** A system that is used to maintain high forest cover, regeneration of desirable species, and development of trees through a range of diameter or age classes. Prescriptions to obtain this structure include single-tree selection (STS) and group selection (GS). Approximately 50 percent of the basal area of trees will be retained on these units.
- **Even-aged Management:** Most merchantable trees would be harvested. The objective is to create a fast-growing stand of trees to maximize wood fiber production. Some trees may be left to create future stand diversity if the largest trees can be removed safely. This can be achieved generally if the stand will be helicopter or shovel yarded. The stand would regenerate into a mostly single-aged stand. In some instances, trees are left in the unit to promote regeneration of a specified species. This type of prescription is called Seed Tree (ST). Other prescription types can include even-aged clearcut with reserves (EACCR) or clearcut (CC).



### Watersheds and Fisheries

- **Two-aged Management:** A system in which the majority of the trees in a harvest unit are cut in one entry and the rest (about 20 to 30 percent of the unit) are left as residual trees either singly or in patches. The residual trees remain unharvested to provide structural diversity, and older-aged trees within the second-growth stand. Two-aged clearcutting with reserves (2ACCR) is a prescription that can be used to obtain this stand structure.

The action alternatives contain mostly even-aged silvicultural systems with a small portion of uneven-aged systems. No two-aged system treatment is prescribed for this project.

All known streams are shown on the unit card maps. These streams and any additional streams found during layout will be protected by following the Forest Plan Riparian Standards and Guidelines listed below. Class IV streams will be protected by following Best Management Practices. Timing restrictions for instream work are listed on the road cards.

#### **Process Groups and Channel Types**

A process group describes streams with similar interrelationships between watershed runoff, landform relief, geology, and glacial or tidal influences on erosion and deposition. A channel type more precisely characterizes a stream and helps predict the probable responses to natural and human influences. Channel types incorporate other aspects such as gradient, pattern, stream bank incision and containment and riparian area vegetation communities. See the Forest Plan, Figure D-1 (page D-4) for a visual representation of the typical distribution of channel process groups. Table B-1 shows the Forest Plan channel type codes used on the unit card narratives. Each unit card summarizes the protection. Only the channel types found in the Licking Creek project area are listed.

#### **Riparian Management Areas (RMAs)**

Stream buffers maintain biodiversity and productivity, streambank and stream channel processes and functions, the recruitment of large woody debris into the stream channel, and the beneficial uses of water quality over the short and long term. Riparian Management Areas are areas of special concern to fish, other aquatic resources and wildlife. Riparian areas also include wetland soils and vegetation adjacent to streams. They are delineated according to the Forest Plan, Chapter 4, Riparian Standards and Guidelines (RIP2, III, E).

#### **Riparian Standards and Guidelines for Timber Harvest**

The Tongass Timber Reform Act (TTRA) mandates leaving minimum 100-foot wide buffer strips along both sides of all Class I and Class II streams that flow into Class I streams. This was incorporated into the Forest Plan Standards and Guidelines as "No commercial harvest within 100 feet of Class I streams and Class II streams that flow into Class I streams."

#### **Reasonable Assurance of Windfirmness**

For Floodplain (FP), Alluvial Fan (AF), High Gradient Contained (HC), Low Gradient Contained (LC), Moderate Gradient Contained (MC), Moderate Gradient/Mixed Control (MM), and Palustrine (PA) areas, manage an appropriate distance beyond the no-harvest zone to provide for a reasonable assurance of windfirmness of the Riparian Management Area (pay special attention to the area within one site-potential tree height of the Riparian Management Area). Site-potential tree heights vary according to the process groups as follows:

- Floodplain - 130 feet,
- Alluvial Fan - 140 feet,
- High Gradient Contained - 120 feet,
- Low Gradient Contained - 100 feet,
- Moderate Gradient Contained - 100 feet,
- Moderate Gradient/Mixed Control - 120 feet, and
- Palustrine - 85 feet.

Table B-1  
Channel Types in the Licking Creek Project Area

Process Group	Channel Type Code	Channel Type Description
Alluvial Fan (AF)	AF1	Moderate gradient alluvial fan channel
	AF2	High gradient alluvial cone channel
Flood Plain (FP)	FP3	Low gradient, channel width less than 10 meters
	FP4	Low gradient, channel width 10-20 meters
Low Gradient Contained (LC)	LC1	Incision less than 10 meters
	LC2	Incision greater than 10 meters
High Gradient Contained (HC)	HC1 <sup>1</sup>	Shallowly incised muskeg channel
	HC2	Shallowly to moderately incised footslope channel
	HC3	Deeply incised upper valley channel
	HC4 <sup>1</sup>	Deeply incised muskeg channel
	HC5	Shallowly incised high gradient channel
	HC6	Deeply incised high gradient channel
Moderate Gradient Contained (MC)	MC1	Narrow, shallow contained channel
	MC2	Moderate width and incision contained channel
	MC3	Deeply incised contained channel
Moderate Gradient, Mixed Control (MM)	MM1	Narrow mixed control channel
	MM2	Moderate width, mixed control channel
Palustrine (PA)	PA1	Narrow, placid flow channel
	PA2	Moderate width, placid flow channel
	PA5	Beaver dam/pond channel

<sup>1</sup>Do not occur in Licking Creek project area

Source: Forest Plan, pages D-1 - D-3.

## Visual Quality Objectives

The following visual quality objectives from the Forest Plan provide standards for management, based on the landscape's scenic characteristics and public viewing concern.

- **Partial Retention:** Changes in the landscape may be visually evident, but must be integrated into and visually subordinate to the surrounding landscape and should not attract attention.
- **Modification:** Changes in the landscape may visually dominate the surrounding natural landscape, however they should be compatible with the surrounding landscape.
- **Maximum Modification:** Management activities may visually dominate the characteristic or surrounding landscape.

## Scenery Standards and Guidelines by LUD

The guidelines for scenery differ between the two Land Use Designations (LUDs) in the project area that allow timber harvest.

<u>Distance Zone</u>	<u>Modified Landscape</u>	<u>Timber Management</u>
<u>For areas visible from Visual Priority Travel Routes and Use Areas:</u>		
Foreground (0-1/2 miles)	Partial Retention	Modification
Middleground (1/2 – 3 to 5 miles)	Modification	Maximum Modification
Background (3 to 5 miles and greater)	Modification	Maximum Modification

### For areas not visible from Visual Priority Travel Routes:

All areas	Maximum Modification
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The primary scenic objective for the Modified Landscape LUD is to design management activities that, though clearly visible, blend in with the features of the natural landscapes when viewed from Visual Priority Travel Routes and Use Areas. In the Timber Production LUD, management activities may clearly dominate the natural landscape character, but still mimic some visual features of the surrounding landscape while allowing a sustained yield of timber.

### Visual Quality Objectives for Units in the Modified Landscape LUD:

<u>Partial Retention</u>	<u>Modification</u>
Units- 19, 44	Units- 40, 43, 50

### Visual Quality Objectives for Units in the Timber Production LUD:

#### Maximum Modification

Units- 1, 2, 8, 9, 10, 11, 12, 14, 22, 24, 29, 30, 31, 33, 34, 35, 38, 39, 46, 51, 52, 63, 64, 65, 67, 68, 70, 71

## General Mitigation Measures

These general measures apply to all units and roads in the Licking Creek project. The source(s) of each general measure are listed after the measure in terms of individual Forest-wide Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, The Soil and Water Conservation Handbook).

### Air Quality Protection

Design projects to control air pollution impacts and to ensure that the predicted emissions from all pollution sources do not exceed ambient air quality standards, as specified under the Alaska Administration Code, Title 18, Chapter 50. (AIR-112)

### Soil/Water Protection during Timber Sale Planning

Incorporate soil and water resource considerations into timber sale planning. These considerations include:

- site-specific considerations,
- site preparation,
- designating water quality protection needs on sale area maps,
- locating and designing landings for good drainage and dispersion of water,
- incorporating erosion control and timing responsibilities into the Operating Schedule,
- scheduling and enforcement of erosion control during and at completion of the timber sale, including non-recurring "C" provisions to protect soil and water resources in timber sale contracts, and
- seeking an environmental modification of the contract if new circumstances or conditions indicate that soil, water, or watershed damage may occur.

(BMPs 13.1, 13.2, 13.3, 13.4, 13.9, 13.10, 13.11, 13.12, 13.14, 13.17, and 13.18)

### Soil/Water Protection during Road Development

Implement measures to reduce surface erosion and drainage interruption related to transportation. This includes water barring and cross-draining roads using ditches and culverts to prevent water running long distances over roads, closure, and seeding and fertilizing cut-and-fill slopes. (BMPs 14.1, 14.2, 14.3, 14.5, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, and 14.19)

### Soil/Water Protection during Road Management

Conduct road maintenance and snow removal operations to minimize disruption of road surfaces, embankments, ditches, and drainage facilities, and use road closures or other measures to keep road surface and road site erosion at low or background levels. (TRAN23-I, BMPs 14.20 and 14.23)

### Management of Road Use to Reduce Erosion and Sedimentation

Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the higher risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)

### Temporary Road Obliteration

Obliterate temporary roads after use, remove or bypass drainage structures and install waterbars in appropriate places. (RIP2-II and BMPs 12.17 and 14.24)

### Soil/Water Protection during Development of Rock Sources, LTFs, & Other Facilities

Implement measures to reduce surface erosion and other impacts on soils and water from gravel sources and quarries, LTFs, sortyards, and other facilities. (BMPs 14.18, 14.19, 14.25, 14.26, and 14.27)



### **LTF Siting**

Site LTFs in locations which will best avoid or minimize potential impacts on water quality, aquatic habitat, wildlife, and other resources. (TRAN214-V, WILD112, and BMP 14.4)

### **Camp and Facility Siting**

Site camps and other facilities sufficiently far from important seasonal bear concentrations, raptor nest sites, and other important wildlife habitats, to avoid or minimize wildlife-human conflicts. (WILD112).

### **Sanitation at Facilities**

Comply with all regulations for the disposal of sewage at camps, LTFs, and other facilities; require incinerators and/or other bear-proof garbage disposal methods at work camps. (FAC1, FAC22, WILD112-VI, BMPs 12.10, 12.15, and 12.16)

### **Accidental Spills**

Implement measures and plans to prevent the contamination of soil and water from accidental spills of petroleum products and hazardous substances. (BMPs 12.8 and 12.9)

### **Heritage Site Discovery**

Suspend work if a heritage site is discovered during project implementation. Authorize resumption of work only after consultation with the State Historic Preservation Office is complete.

### **Karst/Cave Inventory**

Inventory karst landscapes and cave resources prior to initiation of project planning (including the use of dye tracing). (KARST-III)

### **Maximum Size of Created Openings**

Limit created openings to a maximum size of 100 acres. (TIM114-IV)

### **Maintain Advance Regeneration**

Maintain advance regeneration within the unit to meet reforestation needs and stand objectives. (TIM111-2-I)

### **Maintain Minor Tree Species**

Selectively maintain minor species (e.g., yellow-cedar, western redcedar, Pacific yew), where appropriate for the site, as viable components of future stand, for vegetative diversity, and for seed trees. (TIM111-2-I, TIM114-II)

### **Windthrow Hazards Along the Boundaries of Protected LUDs**

Take measures that protect LUDs which prohibit timber harvest activities from harvested related windthrow. (TIM114-XII)

### **Certification of Reforestation**

Certify that every unit that receives a final harvest meets or surpasses the stocking guidelines and certification standards (FSH 2409.17) within 5 years. (TIM24)

### **Wetland Protection**

Minimize the loss of all wetlands, but particularly the higher-value wetlands (especially fens), and minimize the adverse impacts of land management activities on wetlands; follow Executive Order 11990 and the BMPs. (WET-I, WET-III, BMP 12.5)

### **Beach and Estuary Fringe Protection**

Avoid harvest within the beach and estuary fringe; avoid road construction within this zone, except where no feasible alternative exists. (BEACH 2)

### **Non-Development LUD Protection**

Avoid timber harvest impacts and minimize road construction within non-development LUDs such as Old-growth Habitat, Remote and Semi-remote Recreation, and Wild and Scenic River corridors.

**Connectivity Between Old Growth Reserves**

Provide corridors of old-growth forest between and among medium and large old-growth reserves. Where sufficient connectivity does not exist, or where the minimum Forest Plan criteria are not met, relocate or redesign mapped, small old-growth reserves. (WILD112-XVIII)

**Marine Mammal Protection**

Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching whales, dolphins, porpoises, seals, and sea lions. Site camps, LTFs, and other facilities are to be located at least 1 mile away from known Steller sea lion haulouts. (TE&S-I)

## Site-specific Mitigation Measures Incorporated into Unit and Road Design

The specific mitigation measures that may be applied to selected units and/or roads in a project are identified in this section. The source(s) of each measure are listed after the measure in terms of individual Forest-wide Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, the Soil and Water Conservation Handbook). These measures are listed on each unit or road card as necessary.

**M1 - Protection of Mineral Development Improvements:** Protect known mineral development improvements, such as mine claim markers, by specifications in timber sale and road construction contracts. (MGI2-II)

**K1 - Avoid Effects on Karst/Cave Features:** Avoid road construction or modify harvest unit design to avoid impacts on karst or cave features. (KARST-III4)

**F1 - Riparian Buffers:** Establish no-harvest and selective cut buffers along streams and around lakes to protect riparian areas as defined by the Riparian Standards and Guidelines. Protect buffers from adjacent harvest activities (e.g., directional felling, split yarding, suspension requirements). (RIP2, BMP 12.6)

**F2 - Directional Felling Along Buffers:** Trees identified for harvest will be felled to avoid riparian areas designated for "no commercial harvest" and stream courses. (RIP2-II)

**F3 - Class IV Stream Protection:** Split yard and directionally-fall trees away from Class IV streams without buffers. (RIP2-II)

**F4 - Yarding Across Streams:** Fully suspend logs where yarding is to be done across streams or the full length of a stream or drainage. (RIP2-II)

**F5 - Fish Passage:** Maintain fish passage at Class I and II stream road crossings using properly designed stream-crossing structures (consult the Aquatic Habitat Management Handbook, FSH 2609.24). (FISH112-IV)

**F6 - Use of Bridges:** Install bridges at designated stream crossings to minimize the amount of sediment entering streams and/or to ensure good fish passage (TRAN 214-II).

**F7 - Instream Construction Timing Restrictions:** Implement timing restrictions for instream construction activities for the protection of anadromous and resident fish. (RIP2-II and BMPs 14.6, 14.10, 14.14, and 14.17)

**F8 - Siting of Road-Stream Crossings:** Modify the location of road-stream crossings to correspond with stable stream reaches. (TRAN214-II)

**F9 - Routing of Roads near Streams:** Modify road routes to avoid locations near fish-bearing streams. (TRAN214-II)

Minerals and  
Geology

Karst

Fish, Water, and  
Soils

**F10 - Routing of Roads through Wetlands and Other Sensitive Areas:** Modify location of Forest Development Roads to minimize impact to wetlands, floodplains, estuaries, and tidal meadows. (TRAN214-III)

**F11 - Harvesting Timber in/near Wetlands and Floodplains:** Modify unit design or logging system to avoid or minimize damage to muskegs, other wetlands, or floodplains. (S&W112-I, BMPs 12.4 and 12.5)

**F12 - Management of Road Use to Reduce Erosion and Sedimentation:** Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the higher risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)

**F13 - Storm-proofing Roads:** Design system roads with oversized culverts, outfall riprap, armored dips adjacent to culverts, substantial ditch blocks, drivable waterbars, and/or other measures to prevent culvert failure or erosion during periods of inactivity. (TRAN22-I)

**F14 - Road Storage:** Establish self-maintaining drainages across roads, remove bridges and reestablish natural drainage patterns, and establish vegetation cover on the road to prevent erosion during periods of inactivity. (TRAN22-I)

**F15 - Avoid Harvesting Very High Hazard Soils:** Modify unit design to avoid very high mass movement areas, including slopes exceeding 72 percent. (S&W112-I, BMP 13.5)

**F16 - Avoid Road Development on Very High Hazard Soils:** Avoid road construction along unstable slopes, including slopes exceeding 67 percent. (S&W112-I and BMP 13.5)

**F17 - Soil/Water Protection along Roads on Very High Hazard Soils:** Where avoidance of road construction along unstable slopes is not possible, take special precautions with fill to prevent soil erosion, stream sedimentation, and mass wasting or require full bench construction and end hauling of excavated material. (S&W112-I, TRAN 214-II, and BMP 14.7)

**F18 - Suspension Requirements to Protect Soils:** Use partial- to full-suspension logging systems in areas with high mass movement potential. (S&W112-I, BMP 13.9)

**F19 - Steep, Class III, V-notch Streams:** Establish no-harvest buffers along steep, Class III, v-notch streams with high erosion potential (S&W112-I, BMPs 12.6 and 13.16)

**T2 - Maintain Minor Tree Species:** Selectively maintain minor species (e.g., yellow-cedar, western redcedar, Pacific yew), where appropriate for the site, as viable components of future stand, for vegetative diversity, and for seed trees. (TIM111-2-I, TIM114-II)

**W1 - Clearcutting with Reserves:** Provide for greater habitat diversity on a stand level over time by using clearcutting with reserve trees (even-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD112-III)

**W2 - Seed Tree Method:** Provide for greater habitat diversity on a stand level over time by using the seed tree method (even-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD112-III)

**W3 - Shelterwood Method:** Provide for greater habitat diversity on a stand level over time by using the shelterwood method (even-aged or two-aged systems) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD112-III)

**W4 - Reserves Under a Two-aged Harvest System:** Provide for greater habitat diversity on a stand level over time by leaving reserve trees (two-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD112-III)

**W5 - Patch or Strip Clearcutting:** Provide for greater habitat diversity on a stand level over time by using patch or strip clearcutting (two-aged or uneven-aged systems) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD112-III)

### Timber

### Wildlife and Threatened/ Endangered/ Sensitive Species



**W6 - Selection Harvest:** Provide for greater habitat diversity on a stand level over time by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (WILD112-III)

**W7 - Leaving Nonmerchantable Trees and Snags:** Provide for greater habitat diversity on a stand level over time by leaving most nonmerchantable trees and snags after harvest. (WILD112-III)

**W8 - Restrictions on Helicopter Yarding:** Modify helicopter yarding routes and/or timing of helicopter activity to avoid important wildlife habitats (e.g., mountain goat summer/kidding habitat or active eagle nest sites. (WILD112-XII)

**W9 - Road Closures:** Close roads to motorized use to protect brown bears, wolves, marten and other large predators and furbearers from overharvest. (WILD112)

**W10 - Protection of Goshawk Nests:** Avoid harvest and road construction near confirmed and probable northern goshawk nest sites according to Forest-wide Standard & Guideline TE&S-II, J, 1. (TE&S-II)

**W11 - Timing of Activities and Disturbance at Goshawk Nests:** Avoid continuous disturbance within 600 feet of an active goshawk nest from March 15 to August 15 (TE&S-II).

**W13 - Protection of Bald Eagle Nest Trees/Other Sites and Timing of Activities:** Avoid all activity, modify unit or road design, and/or limit timing of activities, near bald eagle nest trees, perch trees, and winter roost sites in accordance with the Interagency Agreement established with the U.S. Fish and Wildlife Service. (WILD112-V)

**W20 - Protection of Trumpeter Swan Nesting, Brooding, and Wintering Areas and Timing of Activities:** Avoid all activity, modify unit or road design, and/or limit timing of activities, within 0.5 mile of wetlands used by nesting, brood-rearing, and wintering trumpeter swans to avoid impacts. (TE&S-II)

**W24 - Protection of Wolf Dens:** Maintain a 1,200-foot forested buffer, where available, around known active wolf dens. (WILD112-XI)

**W25 - Timing of Activities and Disturbance of Denning Wolves:** Avoid road construction within 600 feet of known active wolf dens. (WILD112-XI)

**W28 - Management of Marten Habitat:** Maintain important features of forest stand structure in harvest units in order to manage high-value marten habitat according to Forest-wide Standard & Guideline WILD112-XVI, A, 2. (This applies to VCUs in higher risk biogeographic provinces). (WILD112-XVI)

**W29 - Rare or Endemic Terrestrial Mammals:** Modify units or roads to avoid habitats supporting rare or endemic terrestrial mammals that may represent unique populations with restricted ranges. (WILD112-XVII)

**W31 - Protection of Sensitive Plant Species:** Modify unit boundaries or road routing to avoid habitats supporting populations of sensitive plant species. (TE&S-II)

**W32 - Protection of Candidate Species or Species of Concern:** Modify units, roads, or other facilities to avoid or reduce impacts on U.S. Fish and Wildlife Service-designated Candidate species and Species of Concern. (TE&S-III)

**W33 - Corridors Between Old-Growth Habitat Reserves:** Avoid harvest in order to maintain corridors of old-growth forest between old-growth habitat reserves and other natural setting LUDs at the landscape scale. (WILD112-XVIII)

## Heritage Resources

**H1 - Avoid Direct Effects on Heritage Resource Sites:** Avoid road construction or harvest unit placement in areas with heritage resource value. (HER-IV)

**H2 - Avoid Indirect Effects on Heritage Resource Sites:** Provide for protection from indirect effects on heritage resource sites near proposed harvest units and roads. (HER-V4)



## Appendix B

### Recreation and Tourism

**H3 - Mitigation through Data Recovery:** Mitigate valuable heritage resource sites through data recovery. (HER-IV)

**R1 - Access Restrictions for Recreation:** Close or restrict access on roads to maintain remoteness of areas after harvest (REC112-II)

**R2 - Access Improvement for Recreation:** Open roads after project implementation to take advantage of opportunities created by new access. (REC112-II)

### Scenery

**V1 - Clearcutting with Reserves:** Reduce visual contrast with adjacent areas by using clearcutting with reserve trees (even-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS11-III)

**V2 - Seed Tree Method:** Reduce visual contrast with adjacent areas by using the seed tree method (even-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS11-III)

**V3 - Shelterwood Method:** Reduce visual contrast with adjacent areas by using the shelterwood method (even-aged or two-aged systems) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS11-III)

**V4 - Reserves Under a Two-aged Harvest System:** Reduce visual contrast with adjacent areas by leaving reserve trees under a two-aged system as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS11-III)

**V5 - Patch/Strip Clearcutting:** Reduce visual contrast with adjacent areas by using patch or strip clearcutting (two-aged or uneven-aged systems) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS11-III)

**V6 - Selection Harvest:** Reduce visual contrast with adjacent areas by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan Final EIS). (VIS11-III)

**V7 - Leaving Nonmerchantable Trees:** Reduce visual contrast with adjacent areas by leaving most nonmerchantable trees after harvest. (VIS11-III)

**V8 - Modification of Unit Boundaries:** Modify unit boundaries to assure that the harvest unit meets the proposed VQO in partial retention and retention areas. (VIS11-II)

**V9 - Treatment of Rock Sources:** Locate rock sources off the road along Visual Priority Routes, so that rock source development is not apparent from the road and/or use a landscape architect in the planning/design of rock pits. (VIS11-II)

**V10 - Roadside Cleanup:** Provide for roadside cleanup of ground-disturbing activities in partial retention and retention areas. (VIS11-II)

**V11 - LTF Design:** Use low profile LTF design to minimize visibility from Visual Priority Travel Routes and Use Areas. (VIS11-II)

**V12 - Temporary LTFs:** Use temporary LTF and incorporate rehabilitation measures into project analysis and the contract package to reduce long-term visual effects in partial retention areas. (VIS11-II)

### Subsistence

**S1 - Access Restrictions for Subsistence:** Close or restrict access on roads to maintain remoteness of areas after harvest to address subsistence issues. (SUB-I)

**S2 - Access Improvement for Subsistence:** Open roads after project implementation to address subsistence issues. (SUB-I)

## Unit Cards

Unit cards are used to explain site-specific information about each unit. The units are displayed in numerical order. Each narrative card and accompanying map displays the site-specific silvicultural prescriptions, resource concerns, and mitigation for the unit. It also displays the alternatives that the unit occurs in, both on the narrative card and the map. For a comprehensive picture of the proposed units and roads for each alternative, refer to the alternative maps in Chapter 2.

### Narratives

The general measures described in the Introduction to Appendix B apply to all units in the Licking Creek project. Site-specific measures to be applied to a particular unit are listed in the individual unit card narrative, under the appropriate resource of concern.

### Maps

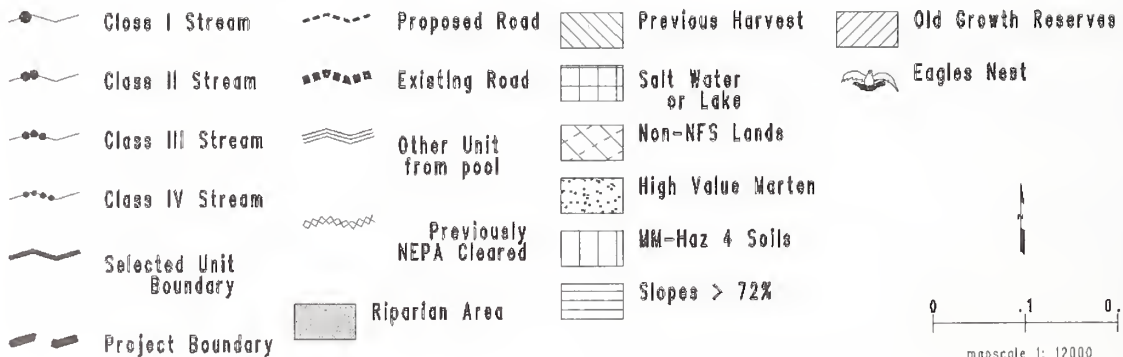
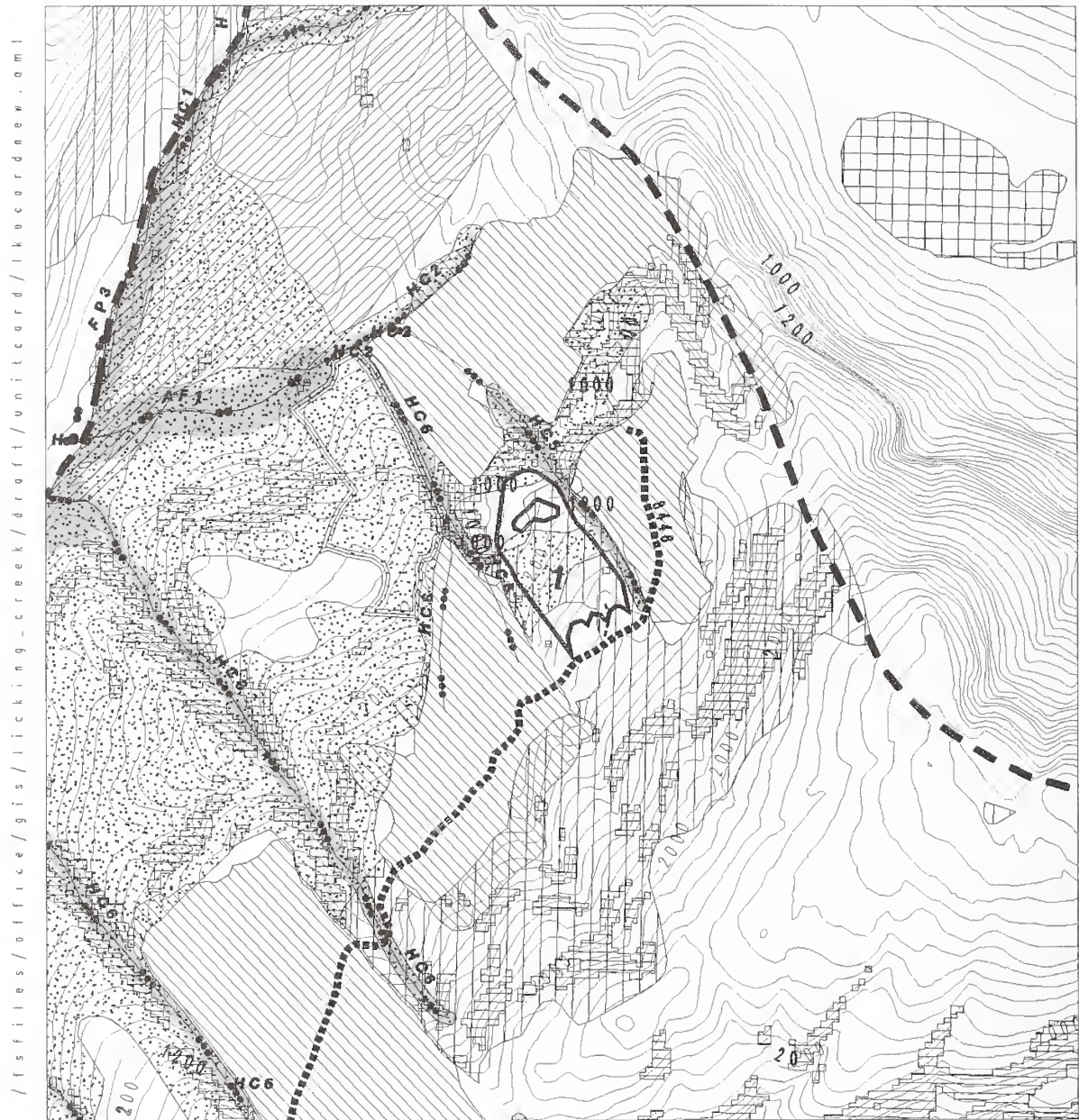
The unit card maps show resource information to support the narrative discussion. Because not everything can be shown on the maps, resources of particular concern for management were selected. These include stream classes and riparian buffers, slopes exceeding 72 percent, mass movement index 4 (MMI4) soils, high-value marten habitat, and Old-growth Reserves. In some instances, slopes exceeding 72 percent may be discussed in the unit card narration but are not shown on the map – this is because GIS did not identify the presence of small inclusions of 72 percent slopes that were discovered in an on-site visit by the soils scientist.

One Licking Creek harvest unit is highlighted on each map. Adjacent Licking Creek units are outlined on the map as “other unit from pool”; they are not numbered.

Madder Timber Sale and Mop Point Timber Sale harvest units (which have been NEPA cleared but are not yet harvested) are shown on the maps as “previously NEPA cleared.” Refer to the Sea Level Timber Sale Record of Decision (ROD) and the Mop Point/91 Knot EA for resource information on these units.

Harvested areas are shown on the maps in slanted hatching. For visual clarity, the other layers (such as MMI4 soils, slopes exceeding 72 percent, and high-value marten habitat) are masked and not shown on these areas.

## Licking Creek Draft EIS Unit: 1 11 Acres in Alternatives: 2 3 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	1	Planned Unit Acres:	11	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74602
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			446

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Logs will be yarded from Road 8446000, an existing road. No new road construction is needed to access unit timber. Short temporary roads may be constructed, except in Alt. 5 in which all timber will be harvested to existing road by helicopter or cable. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class III HC5 East: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2  
Split yarding or partial suspension is required (BMP 13.16 and CT 6.51c). F3, F4

Class III HC6 West: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2  
Split yarding or partial suspension is required (BMP 13.16 and CT 6.51c). F3, F4

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This stand is bordered by three managed stands, harvested in 1993 and 1996, to the north, northeast, and southwest. Windthrow potential is moderate to high due to the edge effect from these managed stands. Overstory is dominated by a mix of tree species. Dominant plant association series are mountain hemlock, mixed conifer and Sitka spruce. Mistletoe infections are moderate to severe.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that unit contains slopes from 65 - 80%; to promote soil stability, logs will be partially or fully suspended with uphill yarding (BMPs 13.2 and 13.9).

**TIMBER:**

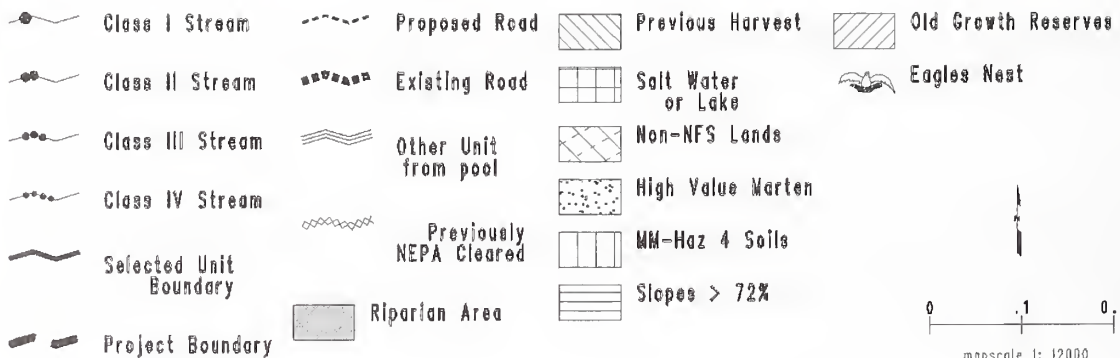
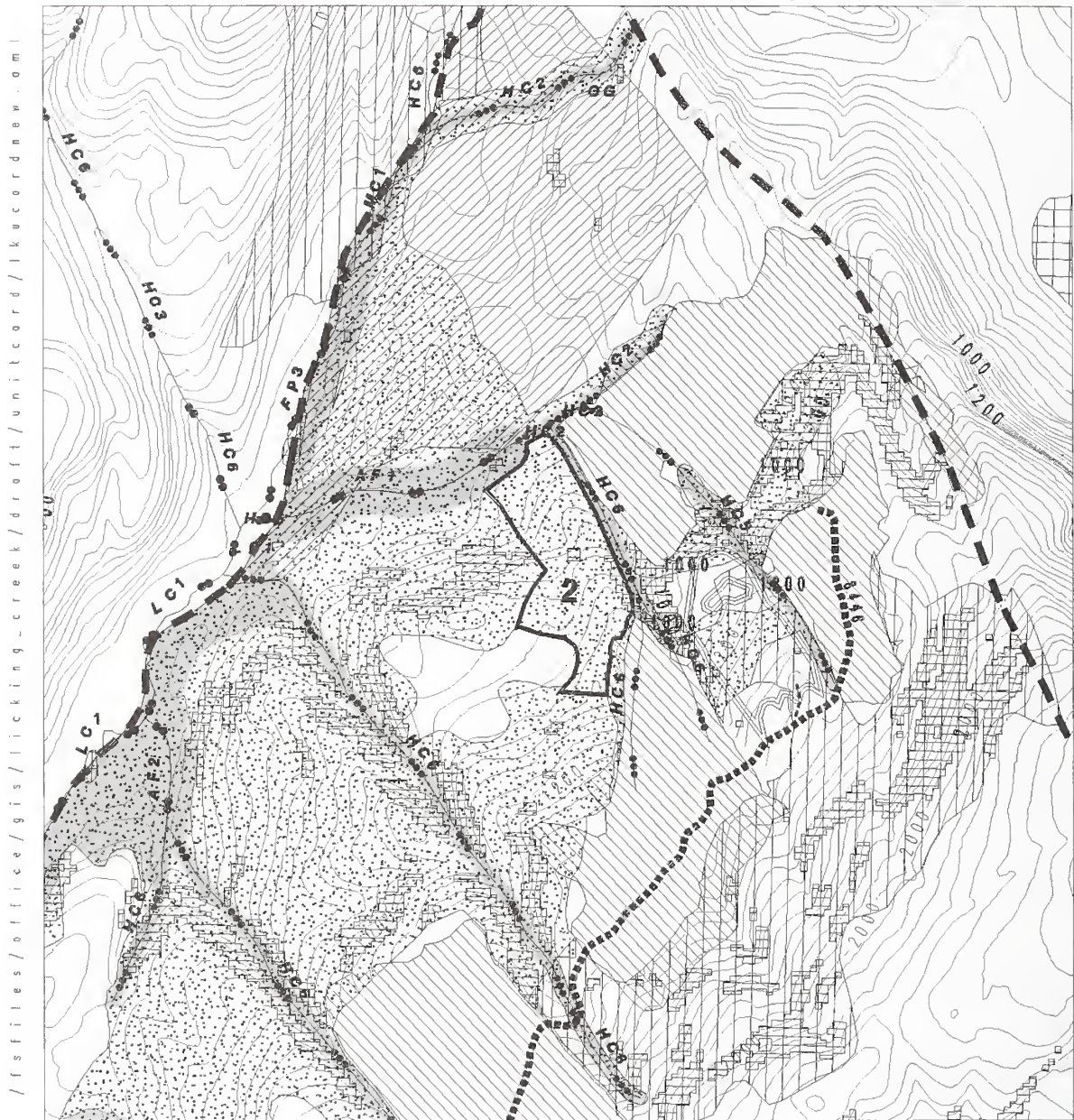
This unit is designed for short-span cable yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 2 17 Acres in Alternatives: 2 3 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

<b>Unit Number:</b>	<b>2</b>	<b>Planned Unit Acres:</b>	<b>17</b>	<b>Silvicultural Prescription:</b>	<b>EACCR</b>	<b>In Alternatives:</b>	<b>2, 3, 5</b>
<b>LUD:</b>	<b>TM</b>	<b>Primary WAA Number:</b>	<b>406</b>	<b>Quad:</b>	<b>KTNC4SW</b>	<b>VCU Number:</b>	<b>74602</b>
		<b>Logging Systems:</b>	<b>Helicopter</b>	<b>Total Estimated Harvest Volume (CCF):</b>			<b>724</b>

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Logs will be helicopter yarded to Road 8446000. There is no new road construction. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class II AF1 North: 140-foot Standard and Guidelines RMA buffer is required. F1, F2

Class III HC2 North: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 East: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 West: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand has a north-facing aspect and shares a border with two managed stands; the one to the northeast was harvested in 1996 and the one to the southeast in 1993. Topography is incised with two V-notches. Overstory is dominated by western hemlock. Understory is dominated by devil's club, salmonberry, and blueberry. Windthrow potential varies from low to high. Mistletoe is very minor.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

No resource concerns were identified.

**TIMBER:**

This unit is designed for helicopter yarding to an existing road.

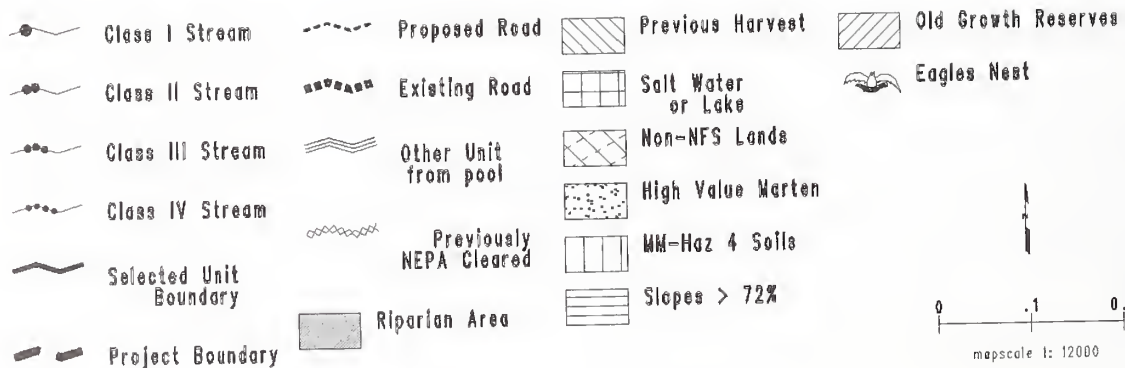
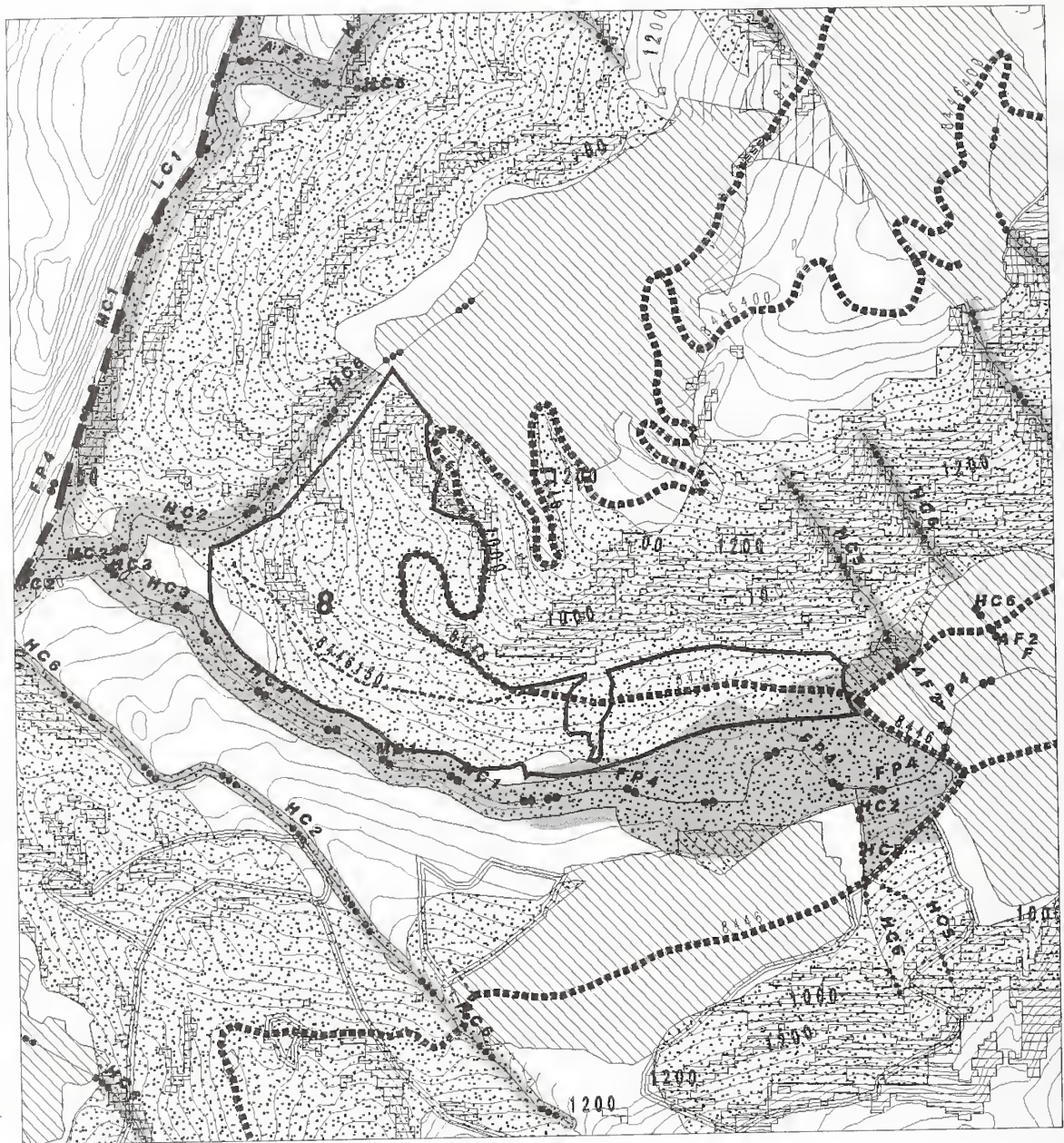
**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh). Interagency Bald Eagle MOU applies. There is a seasonal restriction on repeated helicopter flights within ¼ mile of eagle nests.



## Licking Creek Draft EIS Unit: 8 78 Acres in Alternatives: 4 5

/fstiles/office/gis/licking-creek/draft/unitcard/lickucrdnew.coml



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## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	8	Planned Unit Acres:	78	Silvicultural Prescription:	EACCR	In Alternatives:	4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74602
Logging Systems:		Cable	Total Estimated Harvest Volume (CCF):				3,372

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Road 8446150 accesses Unit 8. Road is located completely within the unit and construction should be moderate over most portions of the road. Road is located to accommodate logging systems and still have least impact on resources. There are no sections where road crosses steep sideslopes exceeding 67%; if road is constructed in areas of rock and full bench excavation, end hauling of excavated material may be warranted (BMP 14.7). See also road cards in Appendix B. In Alt. 5 no new roads will be constructed - entire unit will be helicopter yarded to existing Road 8446000.

**FISH/WATERSHED:**

Class II FP4 South: Greater of 130-foot or floodplain RMA buffer is required. F1, F2

Class II MC1/HC3 Southwest: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 North: Sideslope Standard and Guideline RMA (top of V-notch) buffer is required. F1, F2

Class II HC2 North: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is highly productive. Overstory is dominated by western hemlock and transitions to spruce forest type near the southern border. The understory is dominated by devil's club and blueberry. Windthrow potential is low to moderate. Mistletoe infections are present throughout in varying severities. A managed stand, harvested in 1993, is adjacent to the northeast border.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Elsewhere, leave areas of low productivity forest, stream buffers, etc. to reduce total opening size as this unit also borders Unit 5. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that partial suspension of logs in the steep section of the north side of the unit is required to reduce soil disturbance (BMPs 13.2 and 13.9).

**TIMBER:**

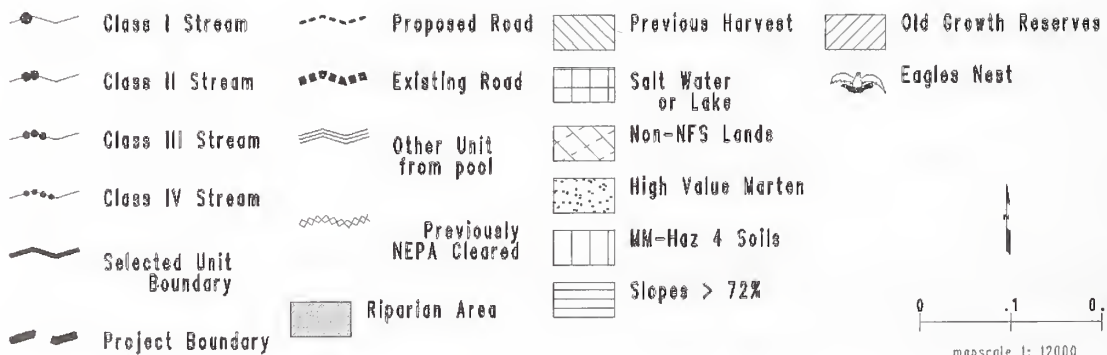
This unit is designed for short-span cable logging. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 9 13 Acres in Alternatives: 3 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	9	Planned Unit Acres:	13	Silvicultural Prescription:	EACCR	In Alternatives:	3, 4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
Logging Systems:		Helicopter	Total Estimated Harvest Volume (CCF):				550

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Logs will be helicopter yarded to Road 8446000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class III HC2/HC6 East: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

Class I MC2 North: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

Additional survey is needed in this unit.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This is a low-lying stand that has irregular, rolling topography. The southeast border is shared with proposed Licking Creek Unit 10. Overstory is dominated by western hemlock. There are a few areas that have a mixed conifer plant association. Windthrow potential is low. Yellow cedar decline is present in one small area. Mistletoe infections are scattered throughout and are minor in severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain all unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber.

**SOILS:**

Slopes greater than 72%: The results of an on-site stability investigation determined that unit contains less than 1 acre of soils greater than 72%. Diameter limit prescription will help maintain rooting strength and slope stability (B/M/P 13.2).

**TIMBER:**

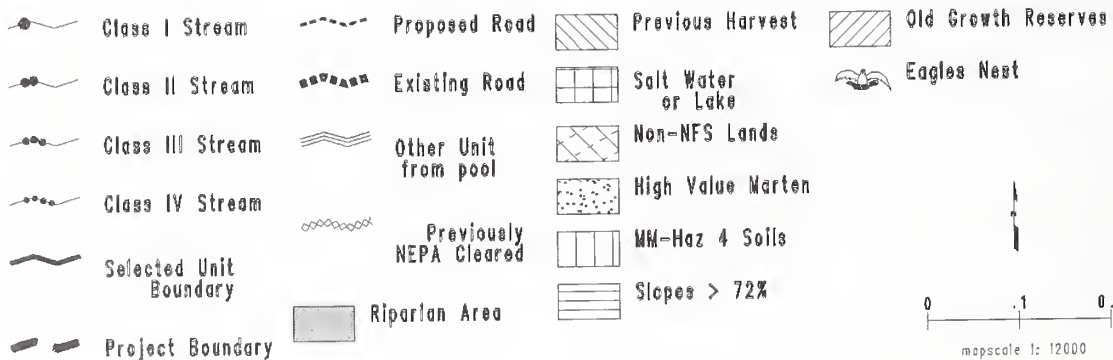
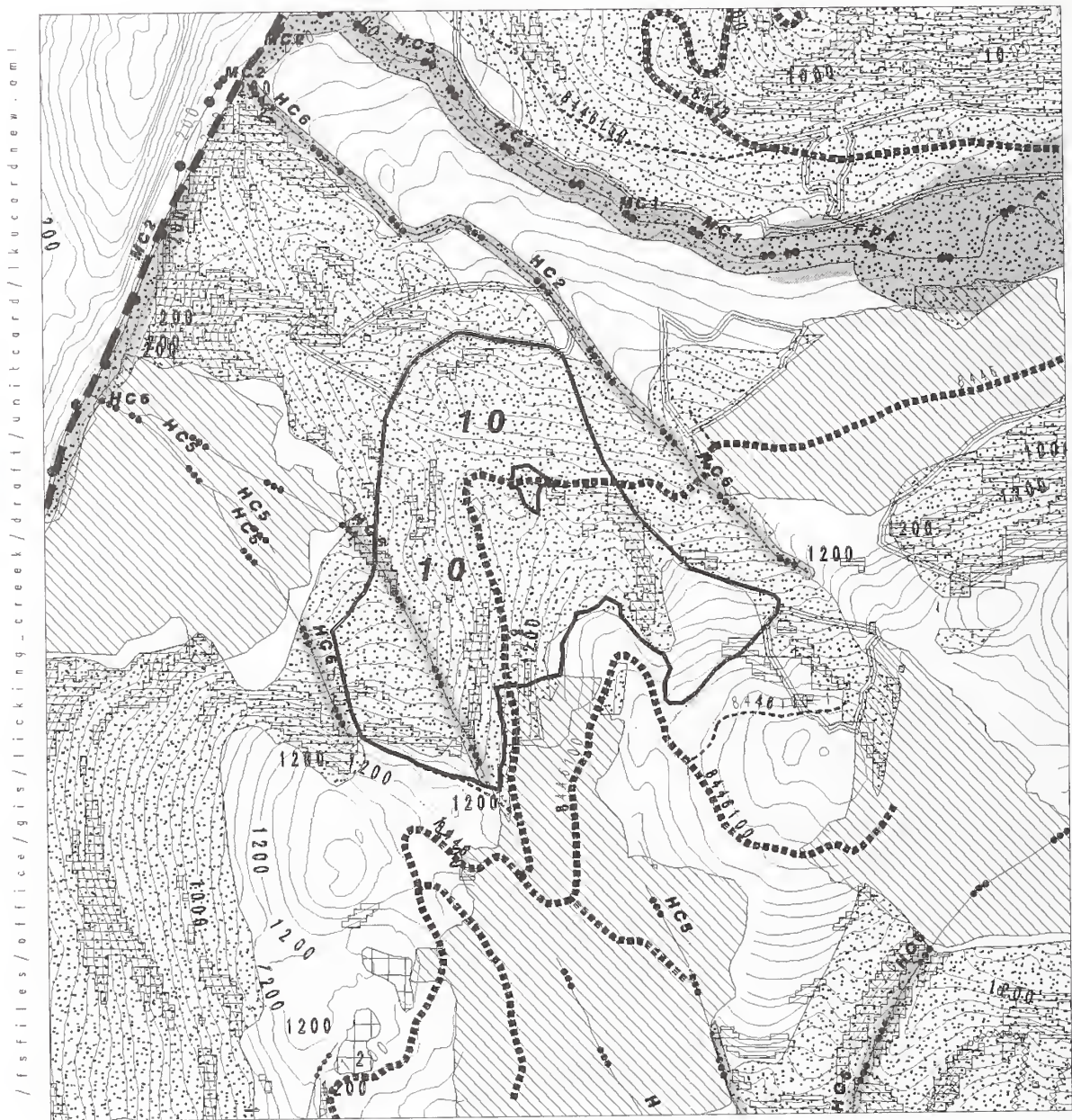
This unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh). Interagency Bald Eagle MOU applies, due to proximity to beach fringe. There is a seasonal restriction on repeated helicopter flights within 1/4 mile of active nests. Band-tailed pigeons may be present within this proposed unit. Surveys were completed in 2002 with no detections.



## Licking Creek Draft EIS Unit: 10 81 Acres in Alternatives: 3 4 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	10	Planned Unit Acres:	81	Silvicultural Prescription:	EACCR	In Alternatives:	3, 4, 5
LUD:	TM, ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			3,559

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Unit will be yarded to Road 8446000. No new road construction is required. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class III HC6 East and West: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 Center: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

A small band of marble containing the karst features lies at the base of a steep (90%) phyllite slope. Due to slope instability evidenced by the failure of phyllite soils and colluvium down into several of the karst features, the unit boundary has been adjusted from the base of the cliffs above the features to the top edge of the cliffs to protect the karst features and stream below (BMPs 13.5 and 13.2). Additional survey is needed in this unit.

**LANDS:** No resource concerns were identified.

**RECREATION/SCENERY:** Unit is seen from Carroll Inlet from viewing points north of Licking Creek looking south. It is in the middleground zone of a Timber Production LUD. It is seen in combination with parts of Units 9, 12 and 14 in some alternatives and some recently cut units on a ridge to the north. Visual Quality Objective is Maximum Modification. To mitigate visual impact of this unit, recommend reducing its apparent scale by prescribing some kind of group selection on the west side of the stream in the southwest corner of the unit, or by incorporating several acres of retention in the center of the west-facing portion of the unit.

**SILVICULTURE:**

Vegetation: This is a large stand that has irregular topography. The two dominant aspects are north and west. A managed stand, harvested in 1962, lies to the west of the stand. Proposed Licking Creek Units 9 and 14 also border this stand. Dominant plant associations are western hemlock and mixed conifer series. Windthrow potential is low. Mistletoe infections are present in moderate severity.

Stand Management Objective: Stand will be predominantly even-aged in approximately 3/4 of the unit with windfirm reserve clumps and scattered trees where possible. In approximately 1/4 of the unit, where scenery is a concern, the structure will be multi-aged. 50-60% of the trees will be retained. Natural regeneration through release of established stems and new tree seedlings is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, throughout the unit which consists of all high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Maintain reserves in the areas of sensitive plants in the north part of the stand and areas of high-vulnerability karst. Elsewhere, leave areas of low productivity forest, stream buffers, etc. to reduce total opening size, as this unit also borders Units 9 and 14. Where possible, retain all unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

Rare and Sensitive Plants: The rare plant *Listera convallarioides* was found in two locations within Unit 10. The area has been marked off with flagging to be protected during yarding.

**SOILS:**

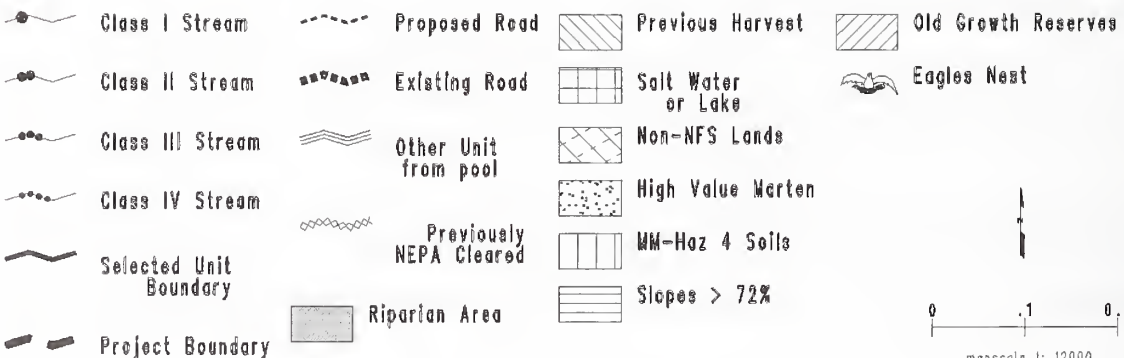
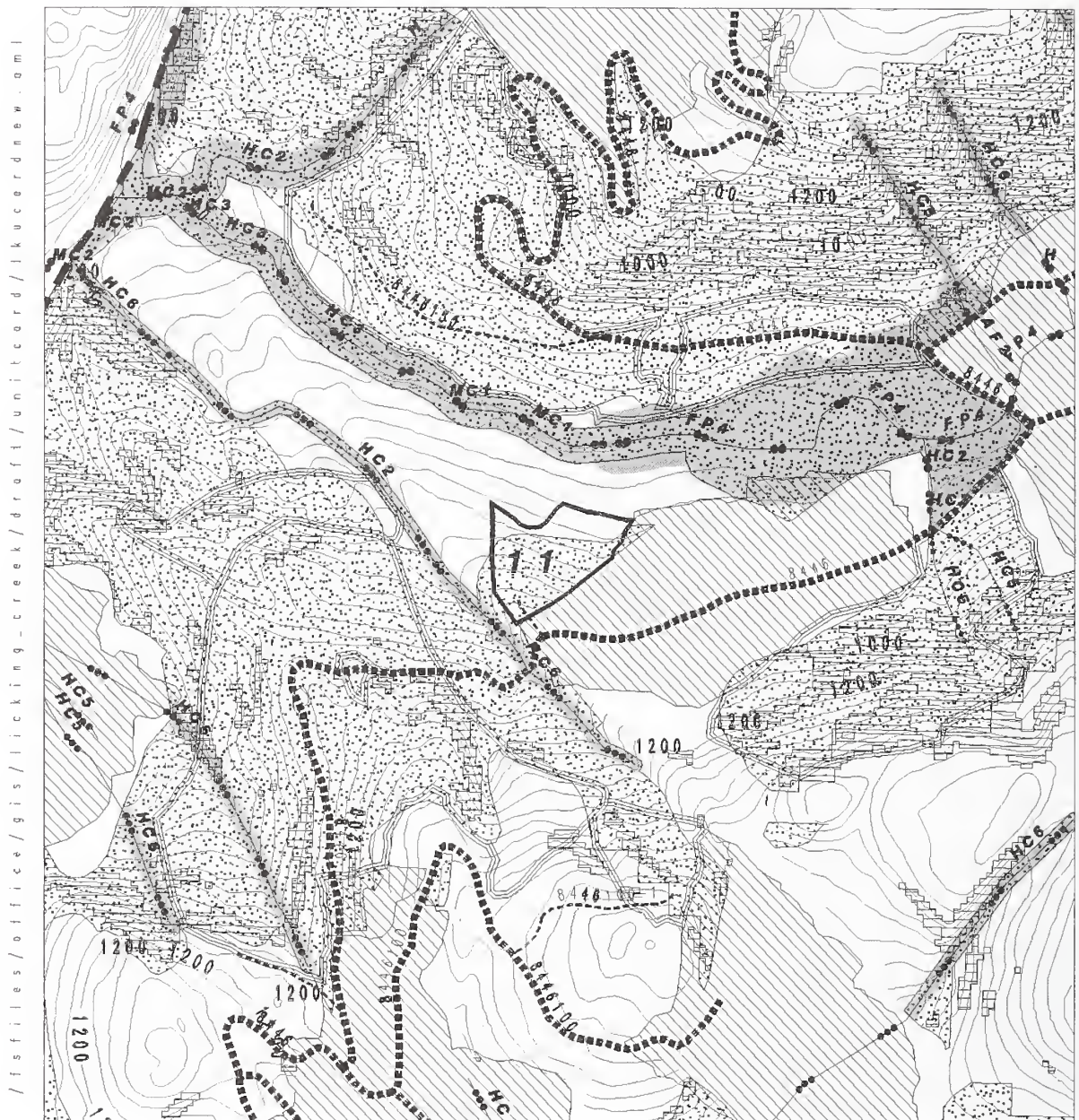
Slopes Greater than 72%: The results of an on-site stability investigation determined that partial suspension is required to protect the steep area below the road (to the west) in the southcentral part of the unit. (BMPs 13.5 and 13.9).

**TIMBER:** This unit is designed for short and long-span cable yarding. For Alternative 5, the unit is designed for a combination of short and long-span cable, and helicopter yarding.

**WILDLIFE:** Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh). Band-tailed pigeons may be present within this proposed unit. Surveys were completed in 2002 but no additional sightings were recorded.



## Licking Creek Draft EIS Unit: 11 9 Acres in Alternatives: 2 3 4



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	11	Planned Unit Acres:	9	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 4
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			401

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is required to harvest unit. Unit will be yarded to existing Road 8446000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class III HC6 South: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is a small, lower-productivity site. It is adjacent to a managed stand, harvested in 1992, along the southeast border. A large muskeg borders stand along the northern boundary. Plant association is mixed conifer/blueberry/skunk cabbage throughout the entire stand, resulting in a varied overstory of western hemlock, red and yellow cedar, and Sitka spruce. Windthrow potential is low. Mistletoe is present.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber along borders of muskegs, and bordering managed stand.

**SOILS:**

No resource concerns were identified.

**TIMBER:**

This unit is designed for short-span cable yarding.

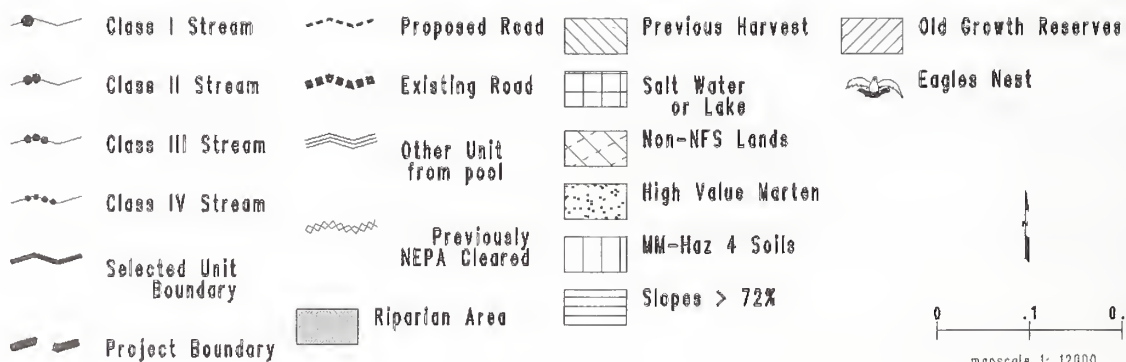
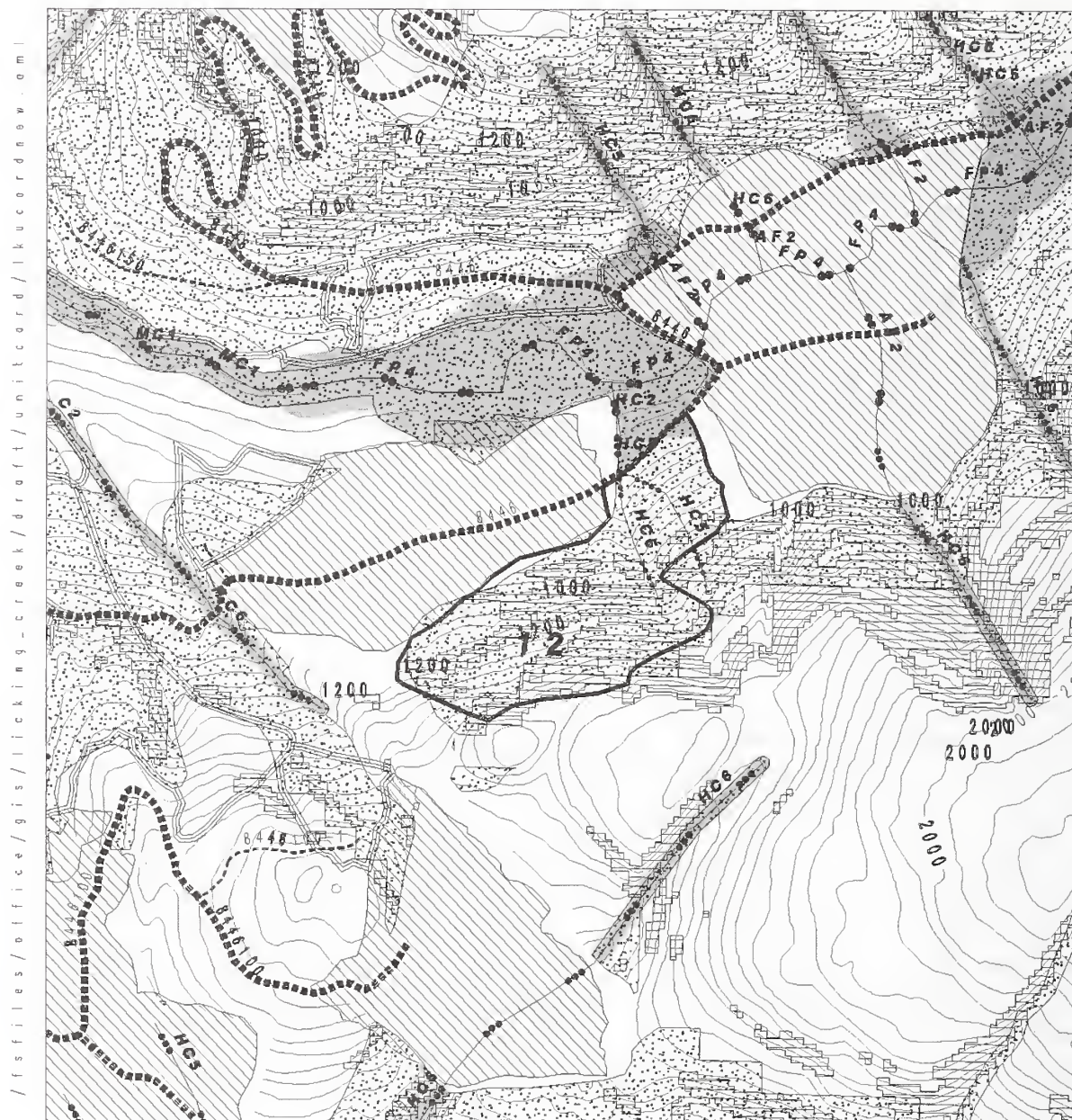
**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh). Band-tailed pigeons may be present within this proposed unit. Surveys were completed in 2002 but no band-tailed pigeons were detected.



## Licking Creek Draft EIS Unit: 12

42 Acres in Alternatives: 2 3 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	12	Planned Unit Acres:	42	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
Logging Systems:		Helicopter and Cable	Total Estimated Harvest Volume (CCF):		1,821		

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is required to harvest unit volume. The portions of the unit that will be harvested by cable systems will yard to the existing Road 8446000. The remaining volume, harvested by helicopter yarding, will be flown to existing Road 8446000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class IV HC5 East (2 each): Split yarding or partial suspension is required (BMP 13.16 and CT6.51c). F3

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Upper part of unit is visible from viewing points on Carroll Inlet. It is in middleground zone of Timber Production LUD. Therefore, Visual Quality Objective is Maximum Modification. To minimize impact created by this unit, Unit 10, and portions of Unit 9, try to concentrate some reserve trees along back line to soften edge of unit. V1

**SILVICULTURE:**

Vegetation: Stand is concave in shape, has a north face aspect and lies to the east and south above a managed stand that was harvested in 1992. There is evidence of windthrow along the edges of the unit that borders the second-growth area. Elsewhere, windthrow potential is low to moderate. Stand is productive—overstory is dominated by western hemlock and Sitka spruce. Understory species include devil's club and salmonberry. Mistletoe is present in entire stand but minor in severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain all unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that slopes greater than 85% in the southern 2/3 of the unit should be excluded from harvest in order to avoid unstable soils (BMPs 13.2 and 13.5).

**TIMBER:**

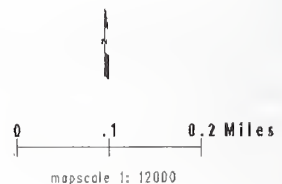
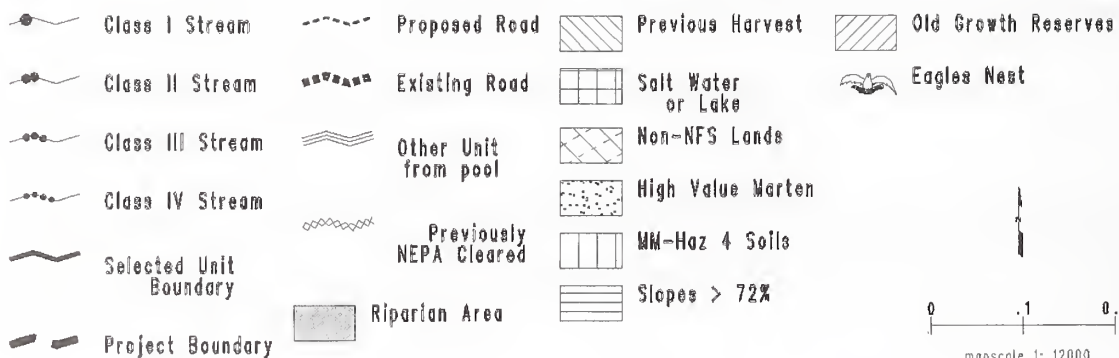
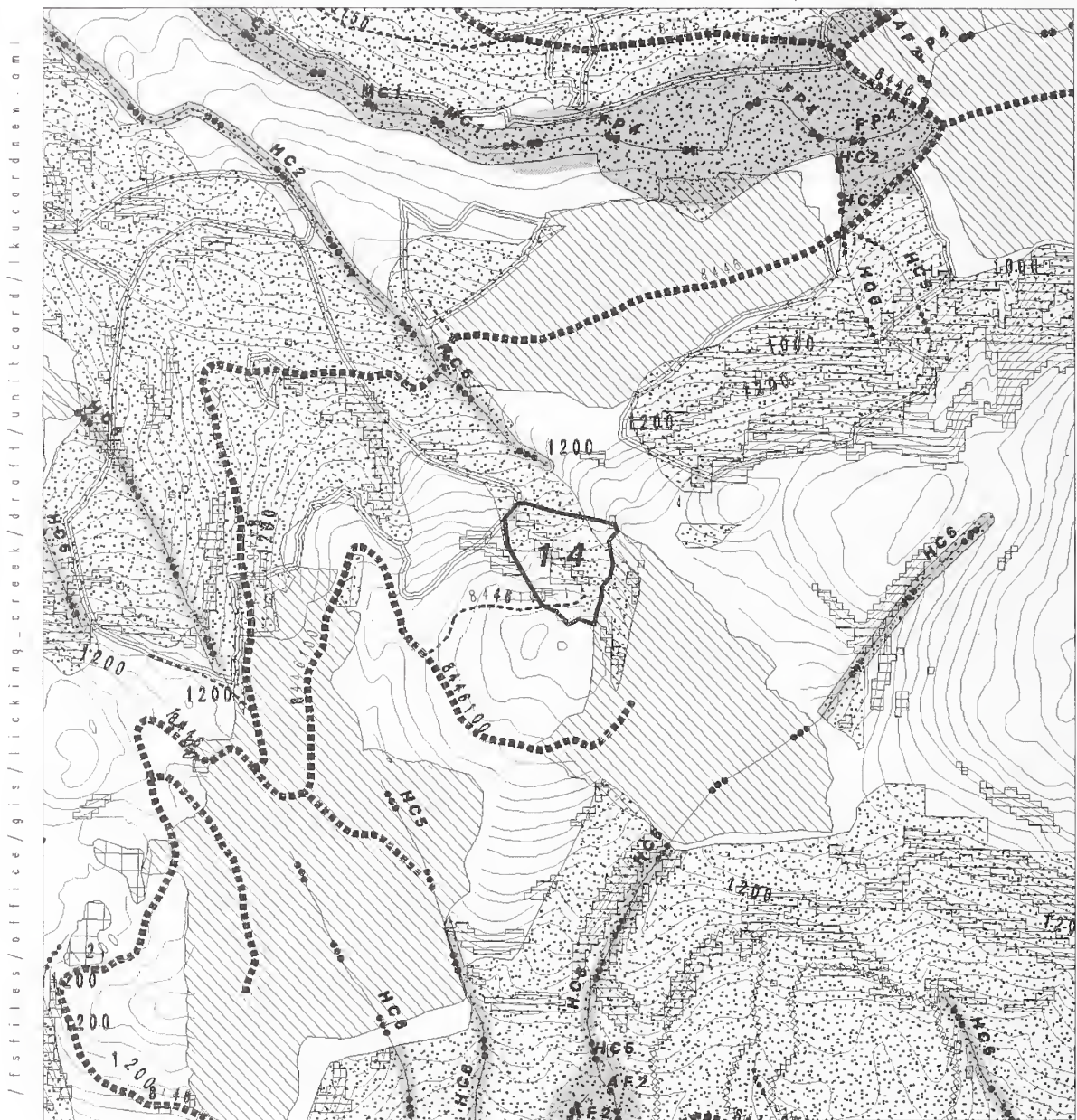
This unit is designed for a combination of helicopter and cable yarding systems. Helicopter yarding will occur on the steeper slopes.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 14 8 Acres in Alternatives: 2 3



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	14	Planned Unit Acres:	8	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			359

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Unit is harvested from a temporary road, constructed from an intersection with existing Road 8446100. Road 8446100 will require a minimal amount of maintenance to prepare road for use. There is no new road construction. See attached road card in Appendix B.

**FISH/WATERSHED:**

No resource concerns were identified.

**GEOLOGY:**

Additional survey is needed in this unit.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is a small, high-elevation unit with moderate to low productivity. Plant associations within the unit vary from mountain hemlock series to mixed conifer series. Unit is bordered to the southeast by a managed stand, harvested in 1990. The northwest corner of unit borders proposed Licking Creek Unit 10. Windthrow potential is moderate to low throughout. Mistletoe infections were present through entire unit in moderate to severe severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Elsewhere, leave areas of low-productivity forest, stream buffers, etc. to reduce total opening size, as this unit also borders Unit 10. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: No slopes greater than 72% will be harvested in this unit.

**TIMBER:**

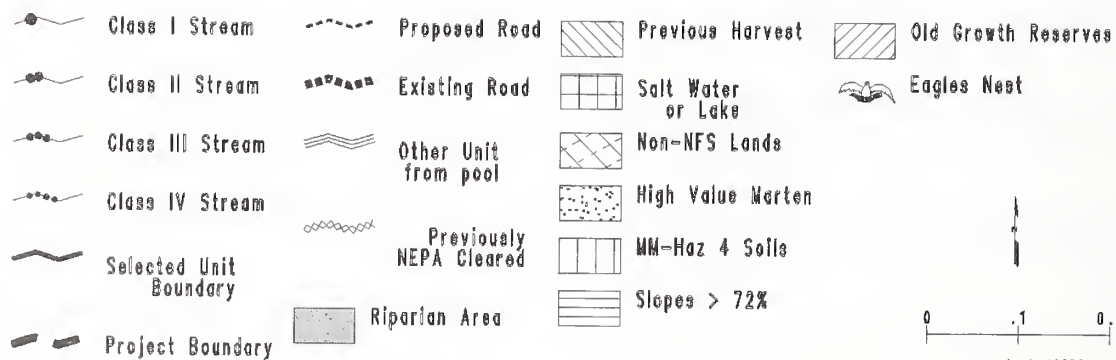
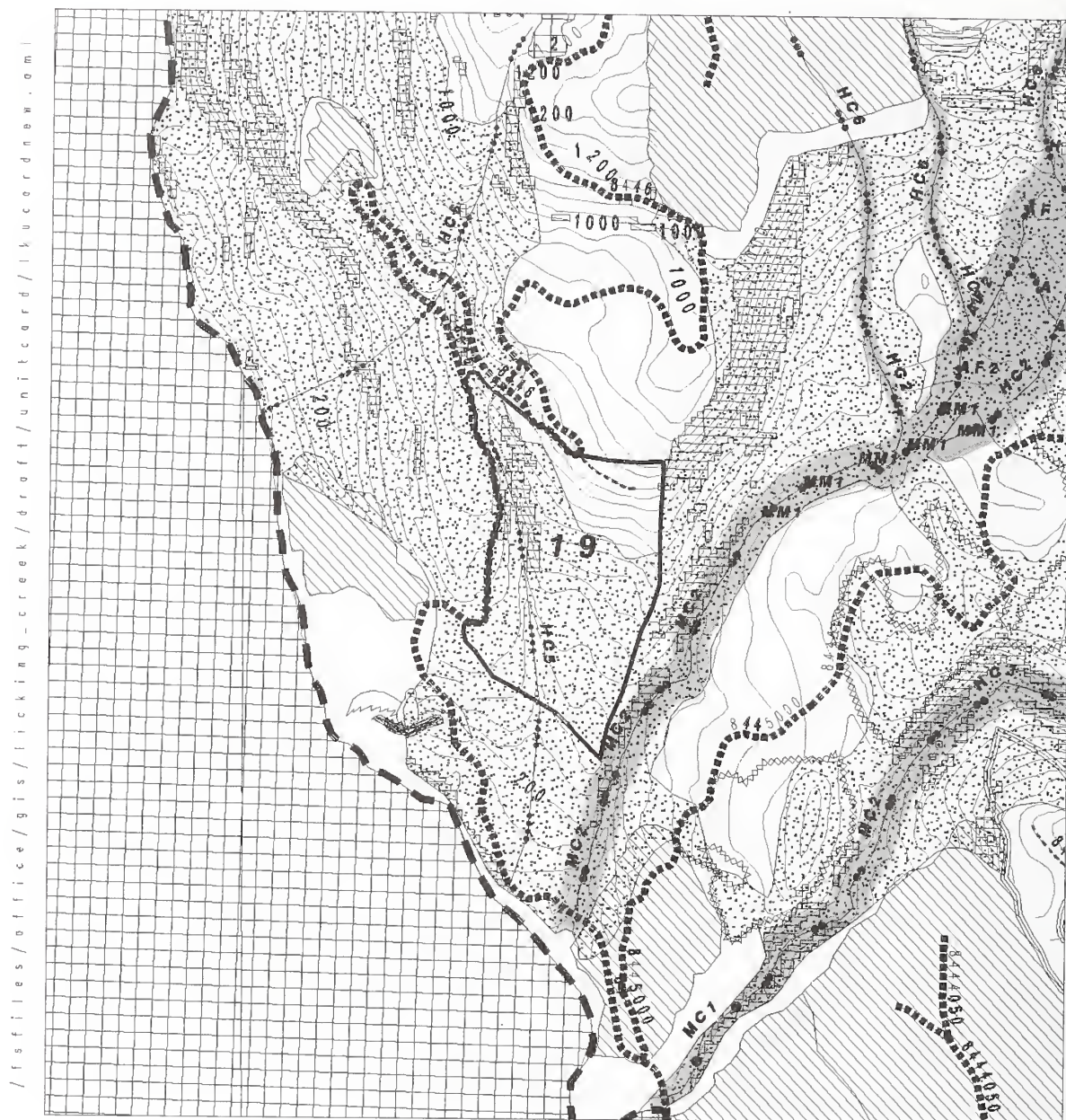
This unit is designed for short-span cable yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh). Band-tailed pigeons may be present within this proposed unit. Surveys were completed in 2002 but no band-tailed pigeons were detected.



**Licking Creek Draft EIS Unit: 19**  
 42 Acres in Alternatives: 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	19	Planned Unit Acres:	42	Silvicultural Prescription:	EACCR GS	In Alternatives:	4, 5
LUD:	ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			1,838

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Unit is scheduled to be harvested from the existing Road 8446000. Temporary roads may be required (except for Alt. 5 which will have no new temporary roads constructed), which would begin at intersections with Road 8446000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class IV HC5 West: Split yarding or partial suspension is required (BMP 13.16 and CT6.51.c). F3, F4

Class II HC2 Southeast: Greater of 100-foot Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

This unit sits on foreground slopes directly above Carroll Inlet. It is in a Modified Landscape LUD. Therefore, the Visual Quality Objective is Partial Retention. Almost entire unit is visible. It is recommended that most of the steeper upper slopes include at least 75% retention, while the gentler lower slopes can have much less retention. There should be no more than a couple of 4-6 acre visible openings in this 42-acre stand, with substantial forested texture left in the remaining part of the unit. V1, V6

**SILVICULTURE:**

Vegetation: Stand is concave in shape and faces south-southwest. Windthrow potential is high in the upper reaches and moderate in the lower reaches. Stand is moderately productive. Overstory is dominated by western hemlock and western red cedar with scattered spruce. Many of the red cedar are very large with high amounts of defect. Plant association transitions to mixed conifer in the lower, south end of the unit. Mistletoe is present throughout entire unit but is mostly minor in severity.

Stand Management Objective: Stand will be predominantly even-aged in the lower and western portions of the unit with windfirm reserve clumps and scattered trees where possible. In a small, upper middle area of the unit, where scenery is a concern, the structure will be multi-aged, with 75% of the trees will be retained in this area. Natural regeneration through release of established stems and ingrowth of new stems is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves in approximately 4/5 of the stand. Leave 25% of the stand structure, scattered, clumped and/or in strips, throughout the unit to maintain structure for scenery and marten habitat. Where possible, retain all unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. In the remainder of the stand, group select, retaining approximately 75% of the trees to address visual concerns. Harvest trees in narrow corridors not to exceed two tree heights in width, concentrating retention in areas that are visible from saltwater and are less susceptible to windthrow.

**SOILS:**

Slopes greater than 72%: The results of an on-site stability investigation determined that partial suspension is required to protect the banks of the Class IV stream in the western edge of the unit (BMPs 13.2 and 13.9).

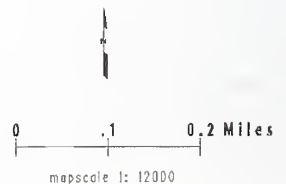
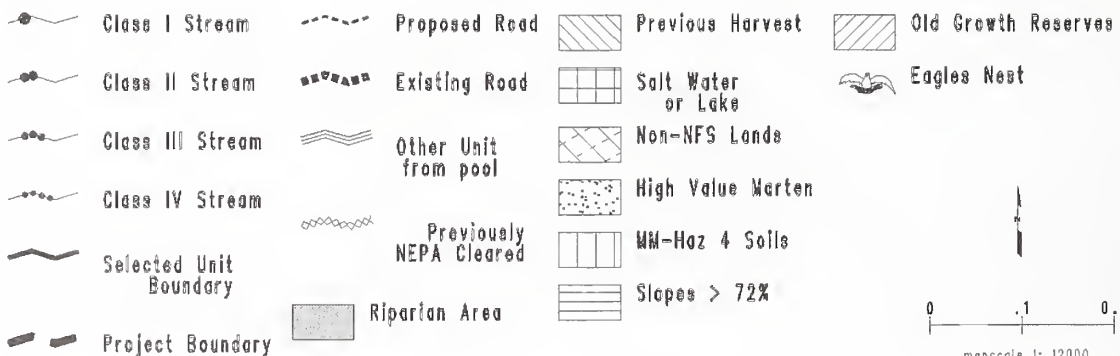
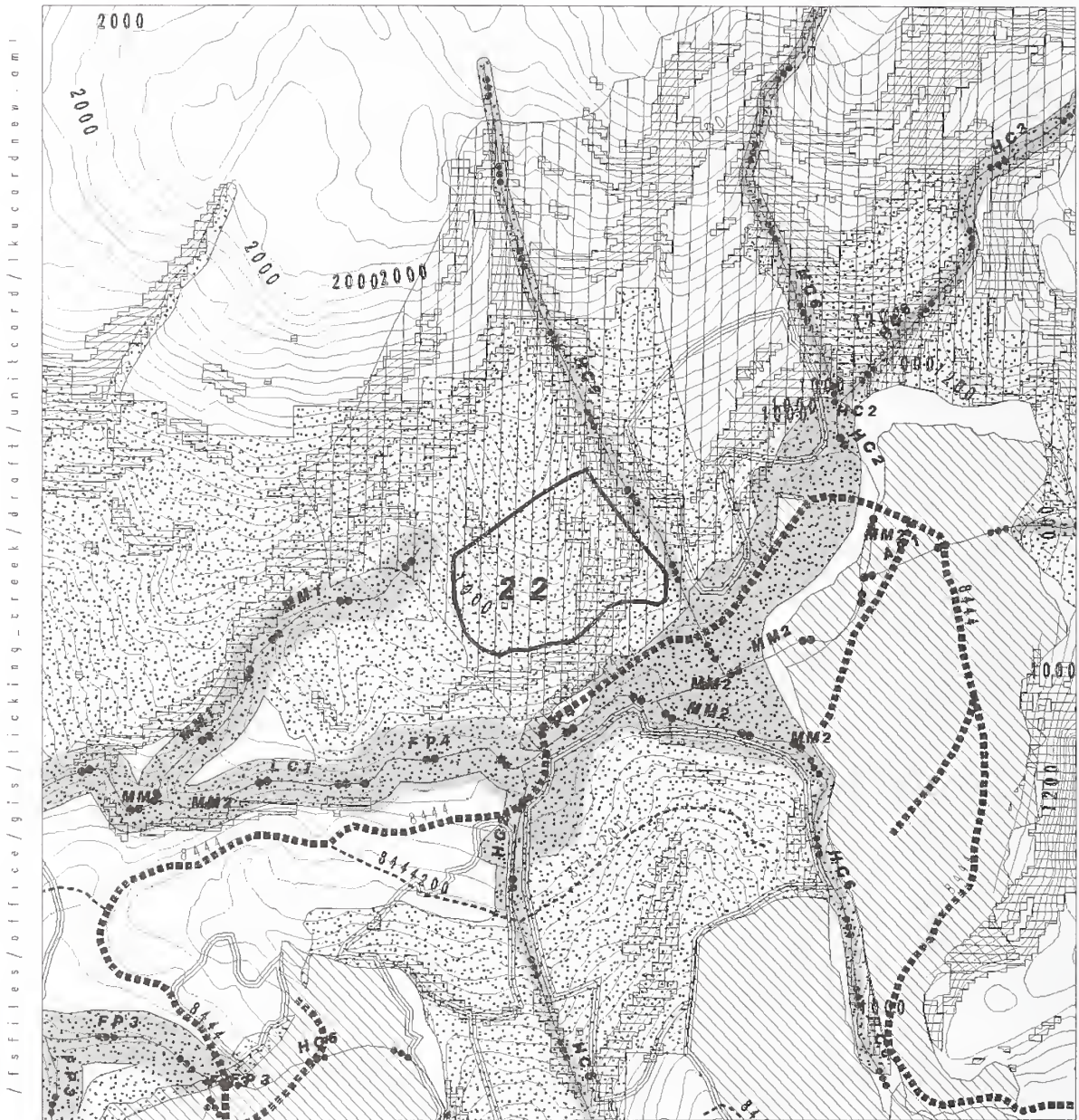
**TIMBER:**

This unit is designed for a combination of short and long-span cable yarding. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter yarding.

**WILDLIFE:** Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 22 22 Acres in Alternatives: 3 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	22	Planned Unit Acres:	22	Silvicultural Prescription:	STS	In Alternatives:	3, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
Logging Systems:		Helicopter		Total Estimated Harvest Volume (CCF):		957	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Unit is scheduled to be harvested by helicopter yarding. Logs will be helicopter yarded to Road 8444000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class II FP4 South: 130-foot Standard and Guidelines RMA buffer is required. F1, F2

Class III HC6 East: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

Class II MM1 West: 120-foot Standard and Guidelines RMA buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Unit is in middleground of Timber Production LUD. The upper portion is visible from Carroll Inlet. Visual Quality Objective is Maximum Modification. To minimize to some degree the visual impact of unit, particularly along the backline edge, concentrate some of the reserve trees in the upper part of the unit. V1

**SILVICULTURE:**

Vegetation: This is a productive unit with steep slopes interspersed with benches. It has a southeast aspect and faces a large drainage area that has been harvested. Overstory is dominated by western hemlock plant association. Mistletoe infections are present but minor in severity.

Stand Management Objective: Stand will have multiple canopy layers and will function as an uneven-aged stand. Natural regeneration, through release of established stems, is expected to be abundant. Future treatments may include a release cutting of some of the overstory stems to allow understory growing space.

Treatment: Apply a diameter limit prescription so as to singly select trees throughout the entire unit. This prescription will remove approximately 40% of the trees. A mix of tree species will be left to maintain original species composition.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that the diameter limit prescription, leaving 60% of the trees, along with helicopter yarding will protect potentially unstable soil, on slopes greater than 72% in the southeast portion of the unit. (BMPs 13.2 and 13.9).

**TIMBER:**

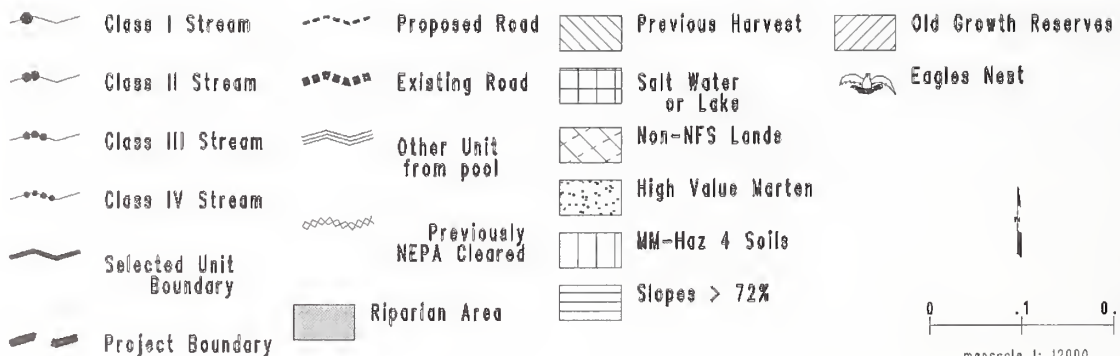
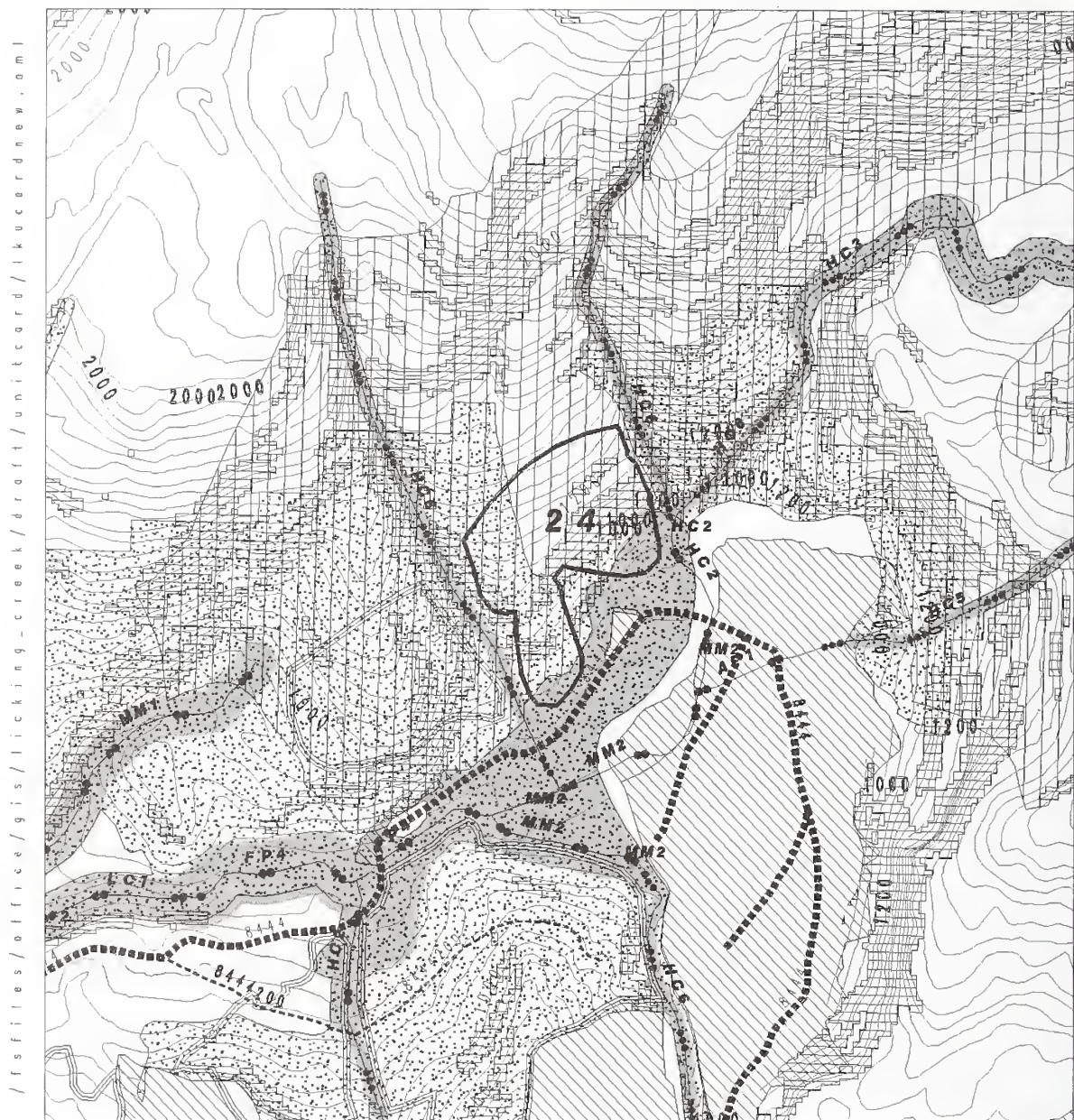
This unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



**Licking Creek Draft EIS Unit: 24**  
 26 Acres in Alternatives: 3 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	24	Planned Unit Acres:	26	Silvicultural Prescription:	EACCR	In Alternatives:	3, 4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74603
Logging Systems:		Helicopter		Total Estimated Harvest Volume (CCF):		1,140	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Logs will be helicopter yarded to Road 8445000. See attached road cards in Appendix B.

**FISH/WATERSHED:**

Class II HC2 East: Greater of 100-foot Standards and Guidelines or RMA (top of V-notch) buffer is required. F1 F2

Class III HC6 East: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 West: Sideslope Standards and Guidelines or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Upper part of unit is slightly visible from viewing positions south of the mouth of Calamity Creek. It is in middleground of Timber Production LUD. The Visual Quality Objective is Maximum Modification.

**SILVICULTURE:**

Vegetation: This is a productive unit with steep slopes interspersed with benches. It has a southeast aspect and faces a large drainage area that has been harvested. Overstory is dominated by western hemlock, displaying even-aged characteristics in the lower reaches of the unit. The upper reaches are characterized by a Sitka spruce plant association. Devil's club is a dominant component of the understory. Wind has played a role in stand development—most of the unit is in understory reinitiation phase. Mistletoe is minor.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in areas of high-value marten habitat within the stand. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of standing timber.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that the southeast corner of the unit consists of slopes ranging from 80-95%. This corner of the unit will be excluded to avoid steep slopes with potentially unstable soil (BMPs 13.2 and 13.5). The remainder of the unit, on slopes less than 85%, is appropriate for harvest, but partial suspension is required to protect unstable soils (BMPs 13.2 and 13.9).

**TIMBER:**

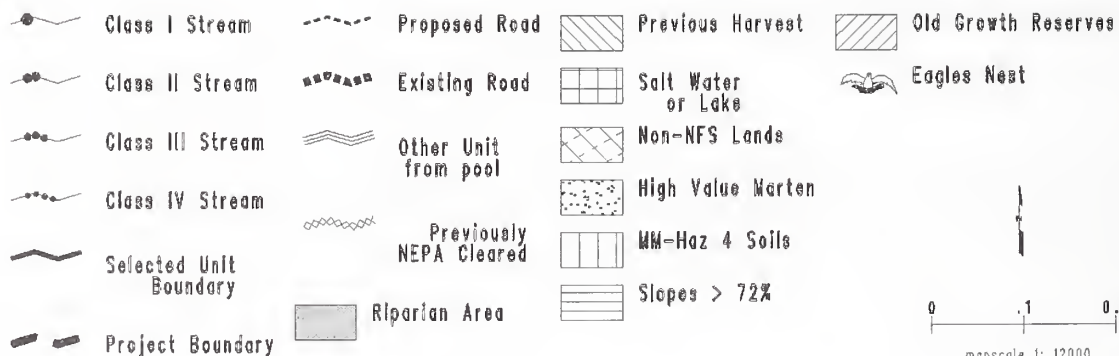
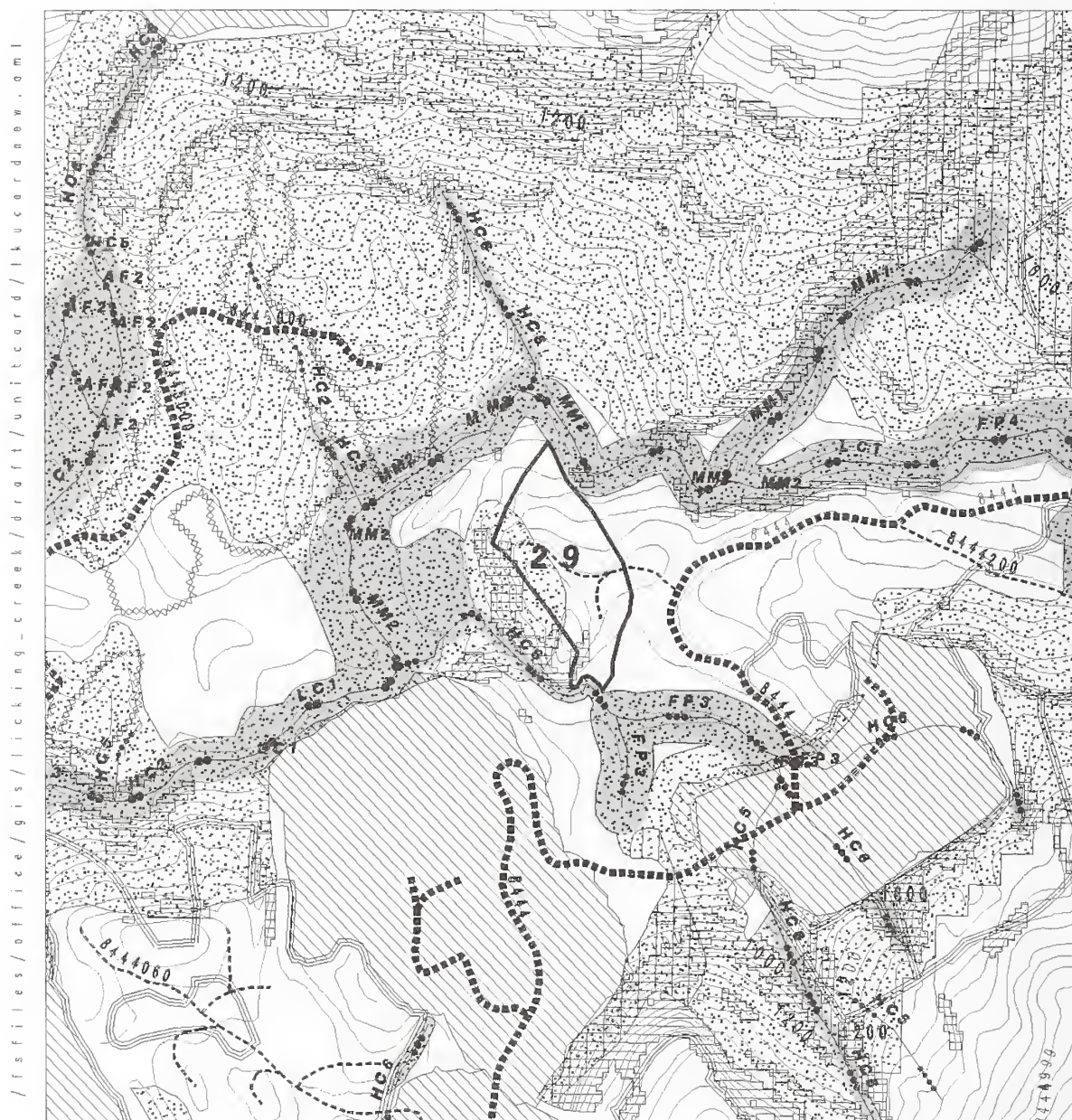
This unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



**Licking Creek Draft EIS Unit: 29**  
 15 Acres in Alternatives: 2 3 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	29	Planned Unit Acres:	15	Silvicultural Prescription:	CC	In Alternatives:	2, 3, 4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			625

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is needed to harvest the unit. A temporary road will be constructed from an intersection with Road 8444000, except for Alt. 5 which will not construct a temporary road. Instead, entire unit will be helicopter yarded to Road 8444000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class II MM2 North and East: Greater of 120-foot or RMA buffer is required. F1, F2

Class III HC5 West: Sideslope Standard and Guideline or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is small, moderately productive and varied in forest type. Western hemlock, Sitka spruce, yellow cedar, and western red cedar all comprise the overstory. Windthrow potential is moderate to high. Mistletoe is present throughout the entire stand in moderate to severe infections.

Stand Management Objective: Stand will be predominantly even-aged with some reserve clumps and scattered trees in the southwestern portion of unit. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Apply a clearcut prescription. There is a an area of high-value marten habitat within the unit, in the southwestern area of the unit. Maintain 10-20% of the stand structure in this area. This prescription will reduce mistletoe, maximize economic return, and minimize risk of windthrow. If possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter.

Rare and Sensitive Plants: The rare plant *Listera convallariodes* was found just outside the unit boundary. If possible, retain or use directional falling of the large spruce above the population to protect habitat.

**SOILS:**

Slopes greater than 72%: No slopes greater than 72% were found in this unit. If slopes greater than 72% are found, place in deferral or exclude from unit unless an on-site visit by a soil scientist determines the area(s) to be appropriate for timber harvest (BMPs 13.2 and 13.5).

**TIMBER:**

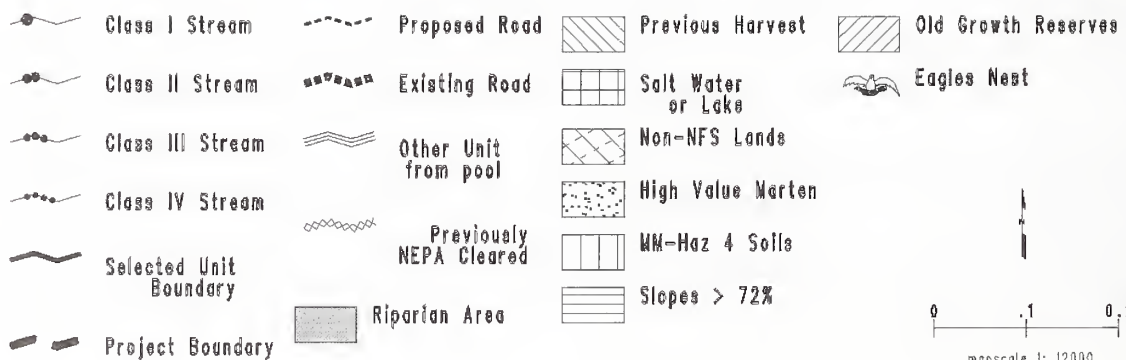
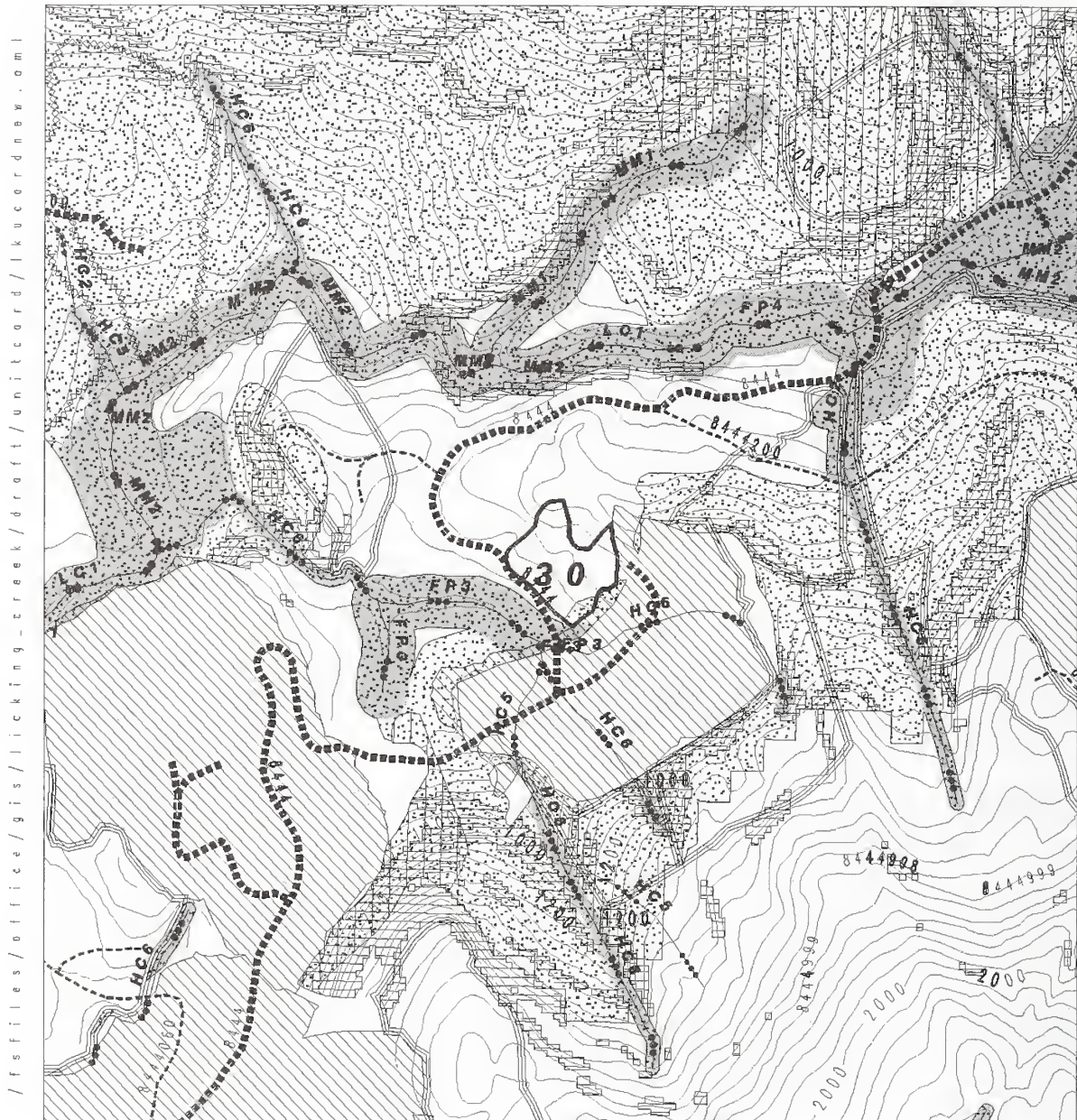
This unit is designed for short-span cable yarding. For Alternative 5, the unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



**Licking Creek Draft EIS Unit: 30**  
 7 Acres in Alternatives: 2 3



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	30	Planned Unit Acres:	7	Silvicultural Prescription:	ST	In Alternatives:	2, 3
LUD:	TM, ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			250

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is required to harvest unit. A temporary road will be constructed from an intersection with Road 8444000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class III FP3 South: Greater of 130-foot or floodplain RMA buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This is a low productivity, mixed conifer stand. The overstory is mostly dominated by western red cedar with components of mountain hemlock, yellow cedar, and western hemlock. The understory is dominated by salal and blueberry. The canopy is patchy and open. Windthrow potential is low except on the western edge, which is adjacent to a managed stand that was harvested in 1990. Yellow cedar decline is present in patches, particularly in the south end of unit.

Stand Management Objective: Stand will be even-aged with a few mature cedar trees scattered through the unit to promote species diversity in the natural regeneration. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is a seed tree cut leaving 2-5 mature red and/or yellow cedar trees per acre scattered through the unit. These trees may be removed once natural regeneration has been established, in approximately 5 years. Natural regeneration should be adequate but should be monitored due to low responses expected in mixed conifer plant associations. T2

**SOILS:**

No resource concerns were identified.

**TIMBER:**

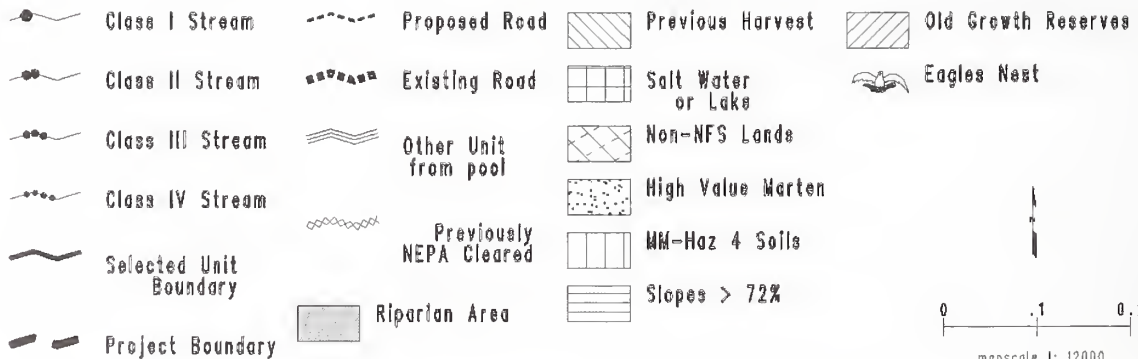
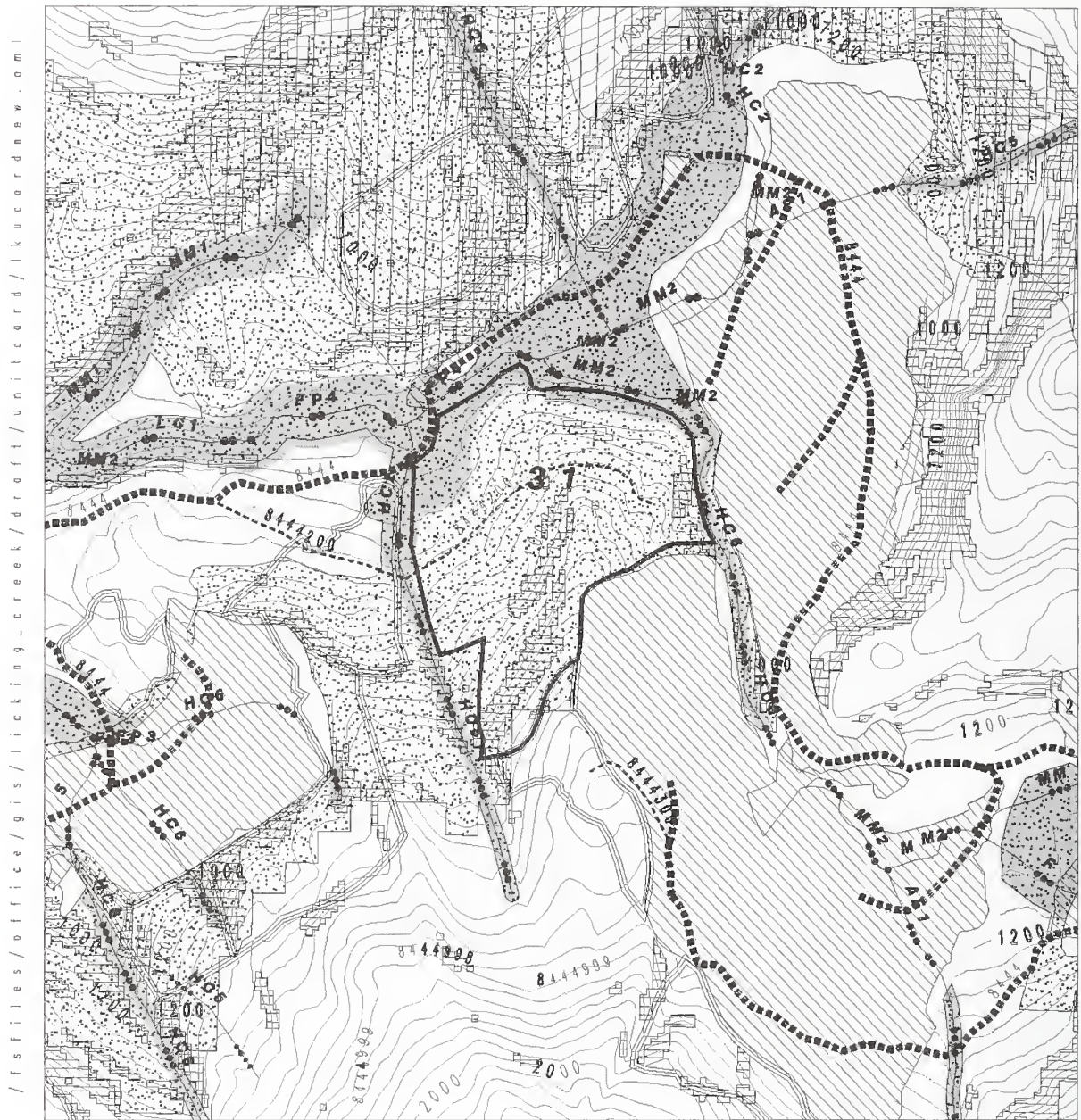
This unit is designed for short-span cable yarding.

**WILDLIFE:**

There are less than 2 acres of high-value marten habitat within this unit; therefore, Marten Standards and Guidelines do not apply in this unit.



## Licking Creek Draft EIS Unit: 31 61 Acres in Alternatives: 3 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	31	Planned Unit Acres:	61	Silvicultural Prescription:	EACCR	In Alternatives:	3, 4, 5
LUD:	TM, ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			2,633

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. New road construction of Road 8444200 accesses this unit. The road leaves existing Road 8444000 such that it can cross the drainage at a favorable location and climbs to a control point. Continue to stay below steep sideslope sections to limit need to excavate for the road prism. Some endhaul of excavated materials may be needed in Unit 31 near the terminus of the road as sideslopes approach 65%. In Alt. 5, no new or temporary road construction will occur – all timber will be helicopter yarded to Road 8444000. See attached road cards in Appendix B.

**FISH/WATERSHED:**

Class II FP4 North: Greater of 130-foot or floodplain RMA buffer is required. F1, F2

Class II MM2 Northeast: Greater of 120-foot or floodplain RMA buffer is required. F1, F2

Class III HC6 East: Sideslope Standard and Guideline buffer (top of V-notch) is to form unit boundary. F1, F2

Class II HC2 West: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 West: Sideslope Standard and Guideline buffer (top of V-notch) is to form unit boundary. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This stand is adjacent to two managed stands, to the east and southeast, that were both harvested in 1989. This stand is also adjacent to proposed Licking Creek Units 33, 34, and 35. Wind disturbance is prevalent in the stand, caused by the large openings created by the bordering managed stands. Stand development stage is understory reinitiation. Overstory is dominated by western and mountain hemlock with scattered, large spruce. Mistletoe was found throughout the stand in minor to moderate severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Elsewhere, leave areas of low productivity forest, stream buffers, etc. to reduce total opening size, as this unit also borders Units 33 and 34. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that a small, steep section in the south end of the unit will be deleted or deferred due to evidence of previous landslides (exposed bedrock) demonstrating this section to be unsuitable for harvest (BMPs 13.2 and 13.5).

**TIMBER:**

This unit is designed for a combination of short and long-span cable logging. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter yarding.

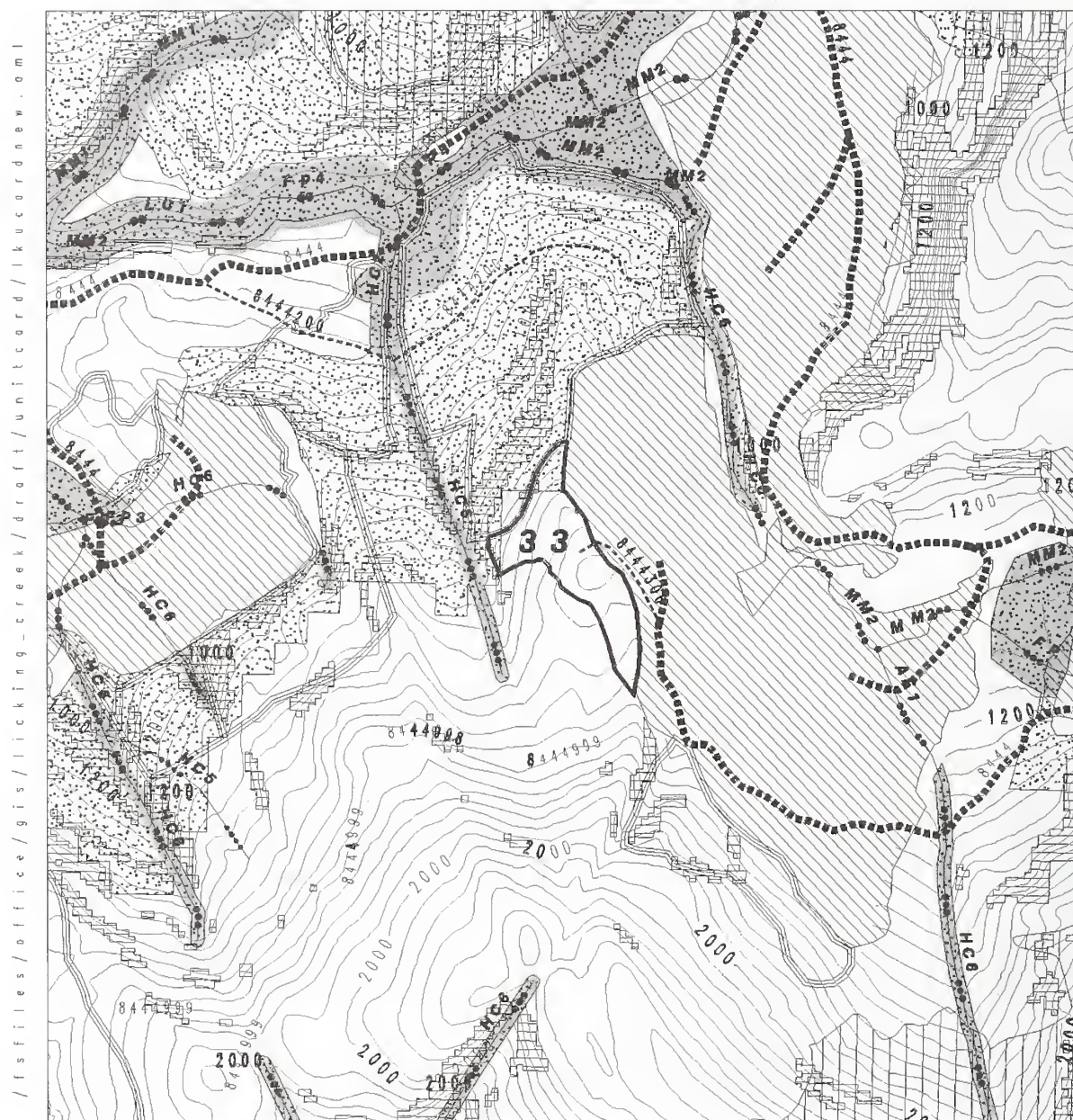
**WILDLIFE:**





















Marten Standards and Guidelines apply: leave 10-20% of the original stand structure in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large downed trees/acre of 20-30" dbh.



## Appendix B

**Licking Creek Draft EIS Unit: 33**  
**11 Acres in Alternatives: 2 3 5**



- |   |                           |   |                            |   |                       |   |                     |
|---|---------------------------|---|----------------------------|---|-----------------------|---|---------------------|
|  | Class I Stream            |  | Proposed Road              |  | Previous Harvest      |  | Old Growth Reserves |
|  | Class II Stream           |  | Existing Road              |  | Salt Water<br>or Lake |  | Eagles Nest         |
|  | Class III Stream          |  | Other Unit<br>from pool    |  | Non-NFS Lands         |   |                     |
|  | Class IV Stream           |   |                            |  | High Value Marten     |   |                     |
|  | Selected Unit<br>Boundary |  | Previously<br>NEPA Cleared |  | MM-Haz 4 Soils        |   |                     |
|  | Project Boundary          |  | Riparian Area              |  | Slopes > 72%          |   |                     |
- 

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scale 1:12000

## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	33	Planned Unit Acres:	11	Silvicultural Prescription:	CC	In Alternatives:	2, 3, 5
LUD:	TM, ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			447

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

New road construction of Road 8444300 will begin near the terminus of Road 8444000. Road 8444000 will require reconstruction. New construction of Road 8444300 begins by climbing up through a previously harvested stand of timber to enter the unit. In Alt. 5, no new or temporary road construction will occur – all timber will be helicopter yarded to existing Road 8444000. See attached road card in Appendix B.

**FISH/WATERSHED:**

Class III HC5 West: Sideslope Standard and Guideline or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

To protect karst features, the fractures and the area that drains into them from the proposed harvest unit have been excluded. The access for the remaining portion of the harvest unit will originate from the end of the existing road.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is a small, high-elevation unit that lies above proposed Licking Creek Unit 31. A managed stand, harvested in 1989, lies adjacent to its entire eastern border. The upper portion of unit is dominated by mountain hemlock and mountain hemlock-Sitka spruce plant associations. The lower portion of the unit is dominated by western hemlock. A minor amount of mistletoe and yellow cedar decline is present.

Stand Management Objective: Stand will be predominantly even-aged with some reserve clumps and scattered trees in the southwestern portion of unit. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Apply a clearcut prescription. This prescription will reduce mistletoe, maximize economic return, and minimize risk of windthrow. If possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

No resource concerns were identified.

**TIMBER:**

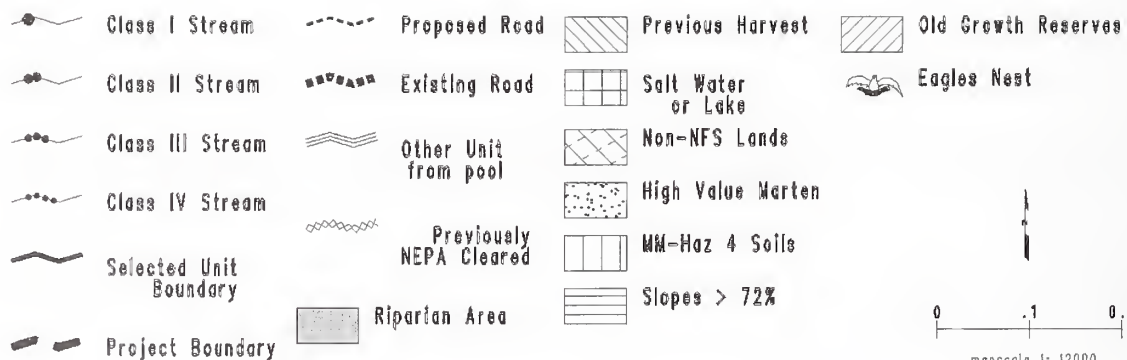
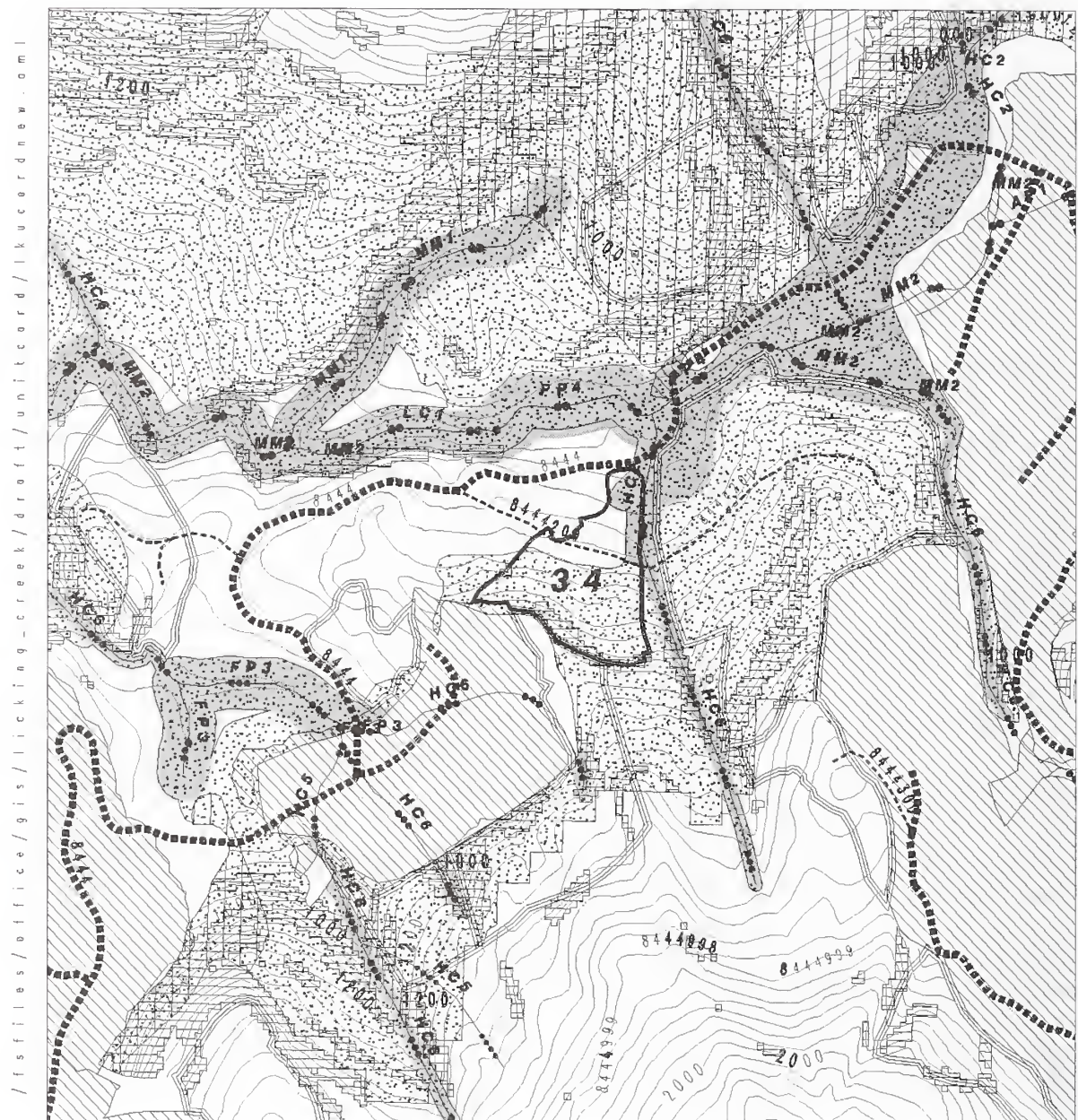
This unit is designed for short-span cable yarding.

**WILDLIFE:**

There are less than 2 acres of high-value marten habitat within the unit, therefore Marten Standards and Guidelines do not apply in this unit.



**Licking Creek Draft EIS Unit: 34**  
 16 Acres in Alternatives: 2 3 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	34	Planned Unit Acres:	16	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 4, 5
LUD:	TM, ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			653

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. New road construction of Road 8444200 begins at an intersection with existing Road 8444000 such that it can cross a drainage at a favorable location. It climbs to a control point and continues following a contour to the landing. Construction is moderate to easy and no steep sideslopes occur. In Alt. 5, no new or temporary road construction will occur – all harvested timber will be yarded to existing road by cable or helicopter yarded to Road 8444000.

**FISH/WATERSHED:**

Class III HC6 Southeast: Sideslope Standard and Guideline RMA (top of V-notch) buffer is required. F1, F2

Class II HC2 Northeast: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2.

**GEOLOGY:**

Harvest method that achieves partial suspension is required to prevent soil disturbance and thus protect karst development of moderate vulnerability (BMP 13.9).

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This stand is bordered to the east by a V-notch stream, to the south by proposed Unit 35 and to the southwest by a managed stand which was harvested in 1990. Overstory is dominated by western hemlock and Sitka spruce with yellow cedar as a minor component. The northwest portion of the unit is low in productivity and muskeg-like. Mistletoe infections are minor in hemlock throughout unit. Cedar decline is present in one small area within stand.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Elsewhere, leave areas of low-productivity forest, stream buffers, etc. to reduce total opening size, as this unit also borders Units 31 and 35. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands. Avoid the northwest corner of the unit that is close to non-commercial forest during layout.

**SOILS:**

Slopes Greater than 72%: The results of an on-site stability investigation determined that the steep area on the west side of the unit be deferred or excluded from the unit to avoid 1/2-acre rock outcrop and associated McGilvery soils (BMPs 13.2 and 13.5). Steep V-notch on east side of unit is to have a windfirm buffer (BMP 13.2).

**TIMBER:**

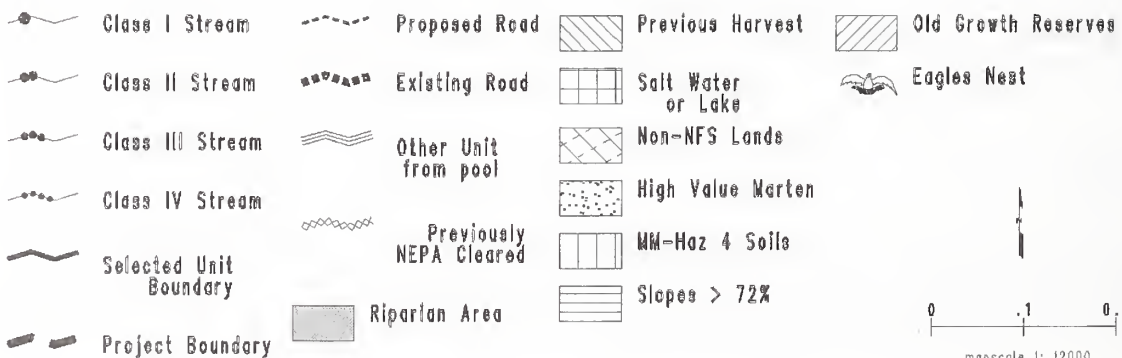
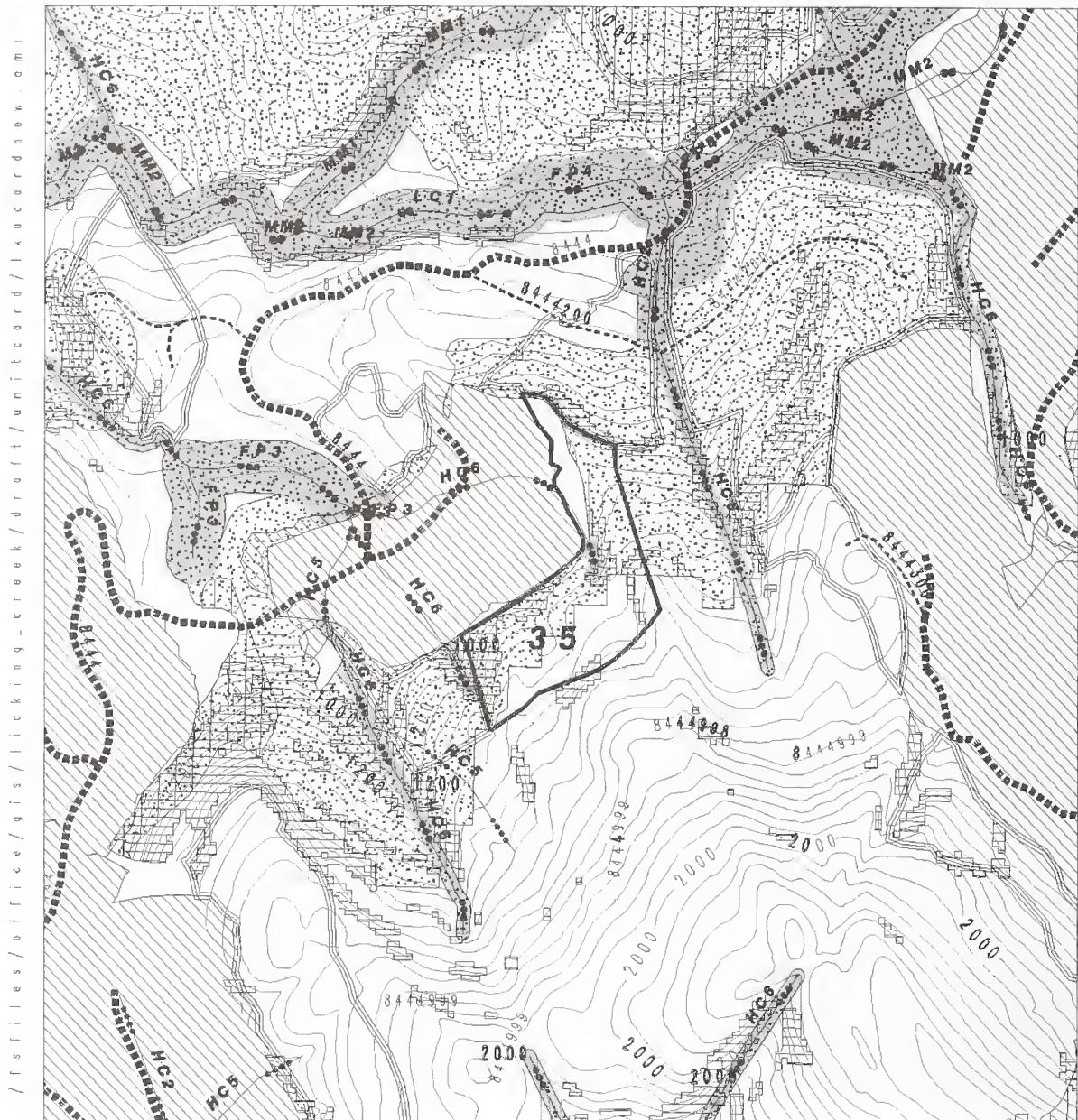
This unit is designed for short-span cable yarding. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 35 25 Acres in Alternatives: 2 3 4



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	35	Planned Unit Acres:	25	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 4
LUD:	ML, TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			1,074

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No roads will be constructed to harvest this unit.

**FISH/WATERSHED:**

Class III HC6 East: Sideslope Standard and Guideline buffer (top of V-notch) is to form unit boundary. F1, F2

Class III HC6 West: Sideslope Standard and Guideline RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

The eastern unit boundary has been moved to avoid high-vulnerability karst.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Topography is irregular with rolling, benchy terrain and many small ridges and V-notches. The lower area of stand is dominated by western hemlock and Sitka spruce. The forest type transitions to mountain hemlock in the upper reaches of stand. Windthrow potential is varied throughout the stand. The northwest boundary is adjacent to a managed stand which was harvested in 1990. Mistletoe and cedar decline is present in some areas but is minor in severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Elsewhere, leave areas of low productivity forest, stream buffers, etc. to reduce total opening size, as this unit also borders Units 31 and 39. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: No slopes greater than 72% were found in this unit. If slopes greater than 72% are found, place in deferral or exclude from unit unless an on-site investigation by a soil scientist determines the area(s) to be appropriate for timber harvest.

**TIMBER:**

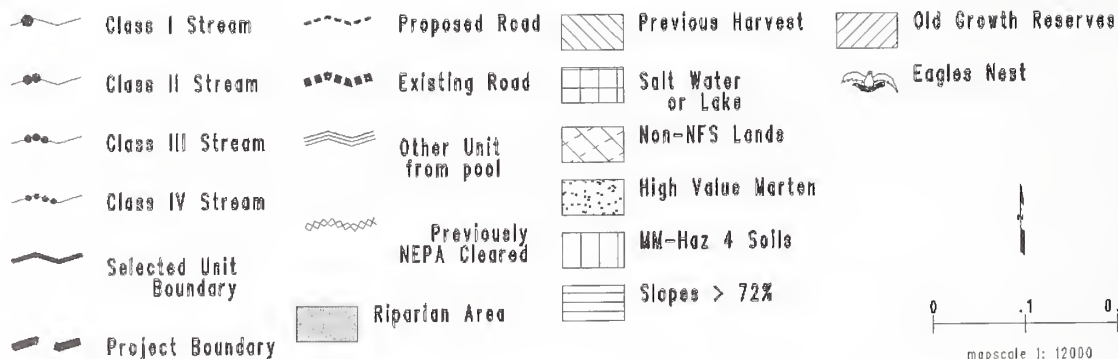
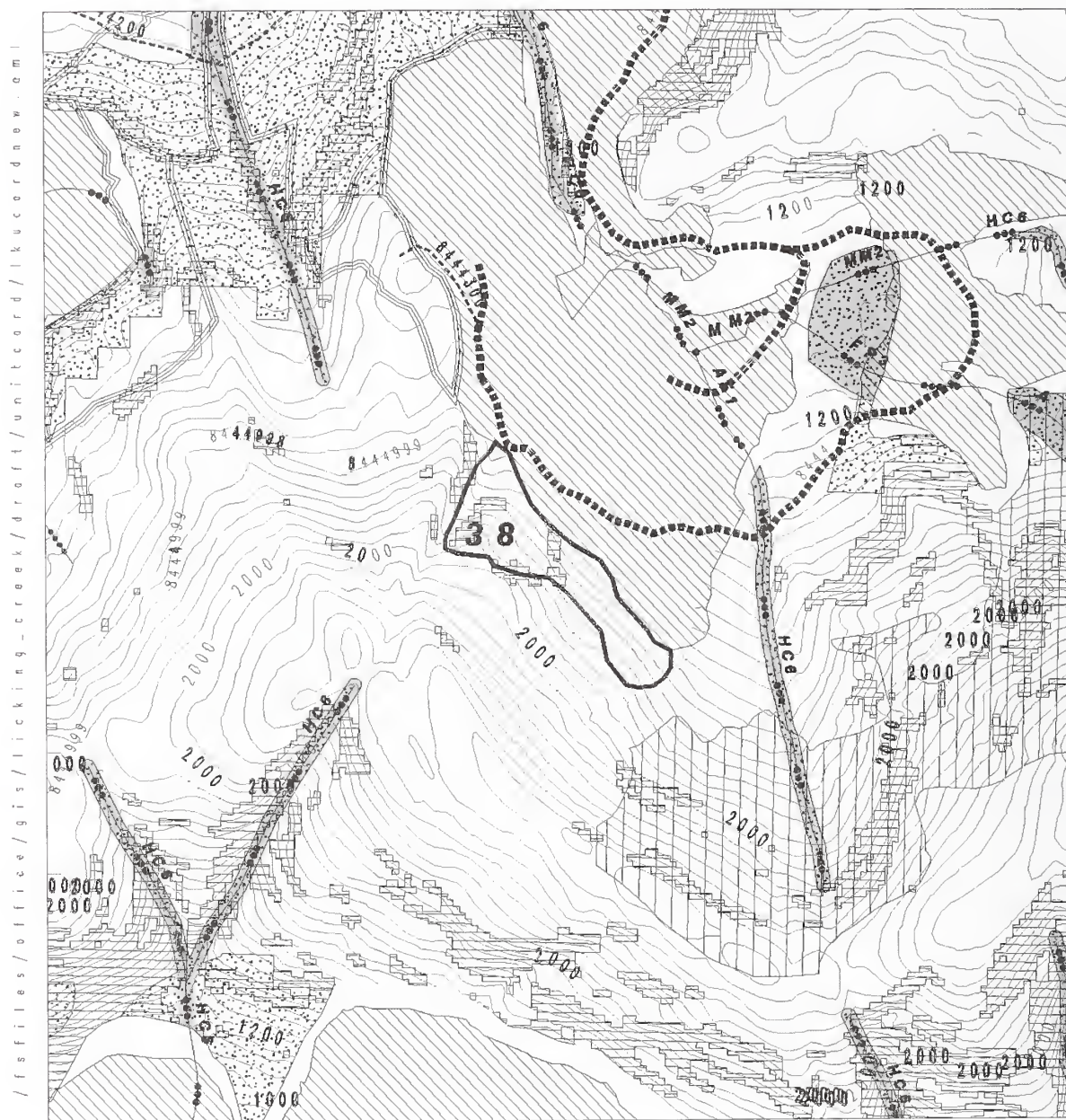
This unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 38 14 Acres in Alternatives: 2 3 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

<b>Unit Number:</b>	<b>38</b>	<b>Planned Unit Acres:</b>	<b>14</b>	<b>Silvicultural Prescription:</b>	<b>CC</b>	<b>In Alternatives:</b>	<b>2, 3, 5</b>
<b>LUD:</b>	<b>TM</b>	<b>Primary WAA Number:</b>	<b>406</b>	<b>Quad:</b>	<b>KTNC4SW</b>	<b>VCU Number:</b>	<b>74604</b>
		<b>Logging Systems:</b>	<b>Helicopter and Cable</b>	<b>Total Estimated Harvest Volume (CCF):</b>		<b>606</b>	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No new road construction. Logs will be helicopter yarded to Road 8444000. See attached road card in Appendix B.

**FISH/WATERSHED:**

No resource concerns were identified.

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is a small, high-elevation, northeast-facing unit that lies between a muskeg system to the southwest and a managed stand, harvested in 1989, to the northeast. Stand is of low productivity and contains mixed conifer and mountain hemlock plant associations. Stem decay was evident in much of the stand. Windthrow was found to have occurred throughout the entire unit.

Stand Management Objective: Stand will be even-aged. Natural regeneration is expected to be abundant but should be monitored shortly after harvest due to the high elevation and lower site productivity. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is even-aged clearcut. This prescription will reduce stand disease, remove highly defected stems, maximize economic return and minimize the risk of windthrow. Avoid isolating strips of timber along the edges of managed stands and muskegs.

**SOILS:**

Slopes greater than 72%: No harvest on slopes greater than 72% will occur.

**TIMBER:**

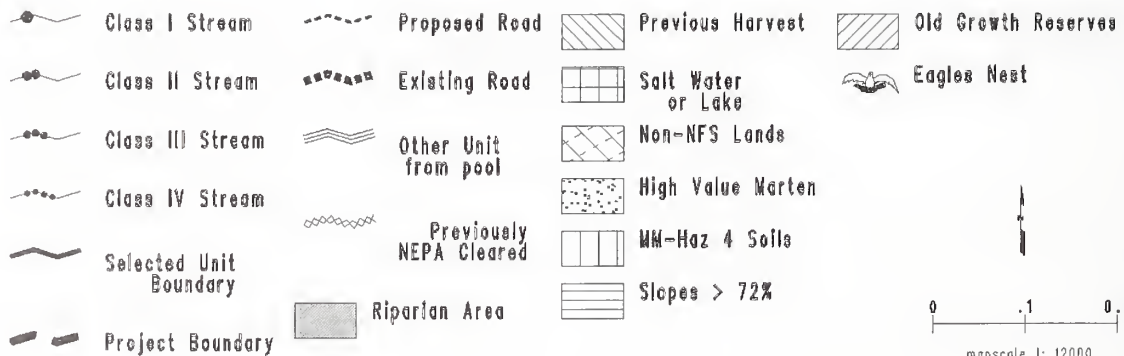
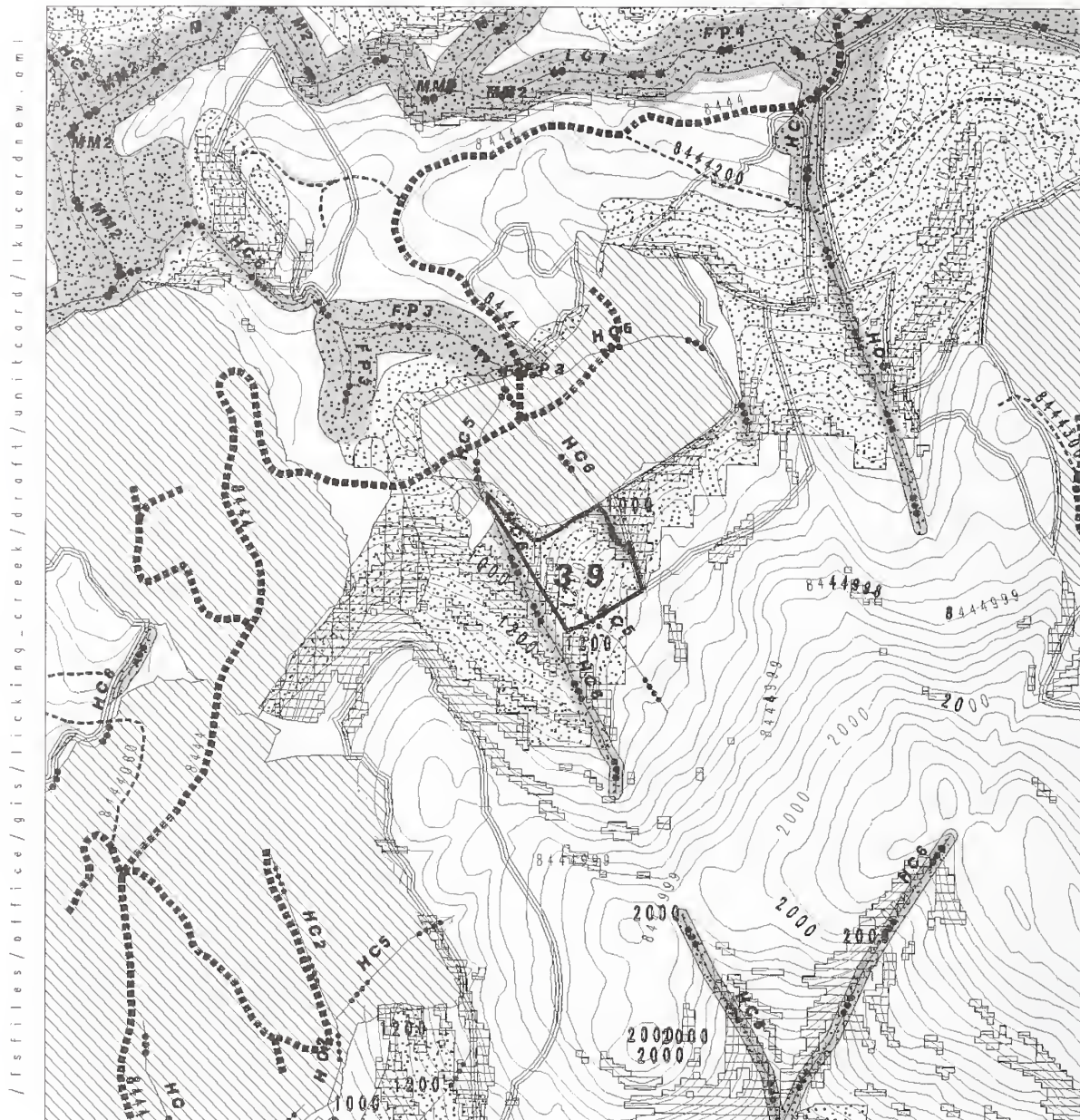
This unit is designed for a combination of helicopter and short-span cable yarding. The helicopter yarding is located above the second growth adjacent to the unit.

**WILDLIFE:**

No resource concerns were identified.



**Licking Creek Draft EIS Unit: 39**  
 9 Acres in Alternatives: 3 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	39	Planned Unit Acres:	9	Silvicultural Prescription:	EACCR	In Alternatives:	3, 5
LUD:	ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
Logging Systems:		Helicopter		Total Estimated Harvest Volume (CCF):		370	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Timber will be harvested by helicopter yarding to Road 8444000. See attached road card for Road 8444000 in Appendix B.

**FISH/WATERSHED:**

Class III HC6 West: Sideslope Standard and Guideline buffer (top of V-notch) is to form unit boundary. F1, F2

Class III HC6 Northeast: Sideslope Standard and Guideline buffer (top of V-notch) is to form unit boundary. F1, F2

Class IV HC5 Center to West: Fall trees away from streamcourse; split yarding or partial suspension is required (BMP 13.6 and CT6.51c). F3, F4

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Topography is fairly irregular and incised, with many draws, notches, and spur ridges. Stand is bordered by a managed stand, harvested in 1990, on the north boundary. Windthrow is evident as a result of the harvested opening. Windthrow potential is high to moderate throughout entire unit. The unit is varied, with western hemlock, red cedar, and yellow cedar in the overstory. Mistletoe and yellow cedar decline are present in scattered areas only.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, throughout areas of the unit that contain high-value marten habitat. Elsewhere, leave areas of low-productivity forest, stream buffers, etc. to reduce total opening size, as this unit also borders Unit 35. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: No harvest on slopes greater than 72% will occur.

**TIMBER:**

This unit is designed for helicopter yarding.

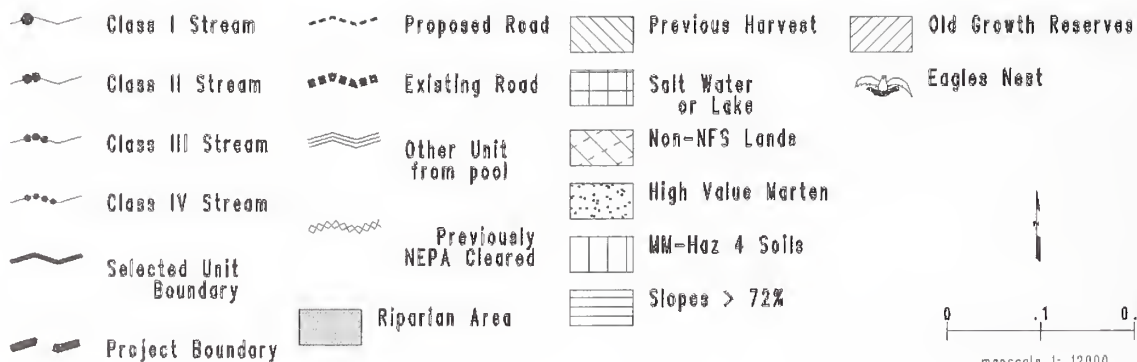
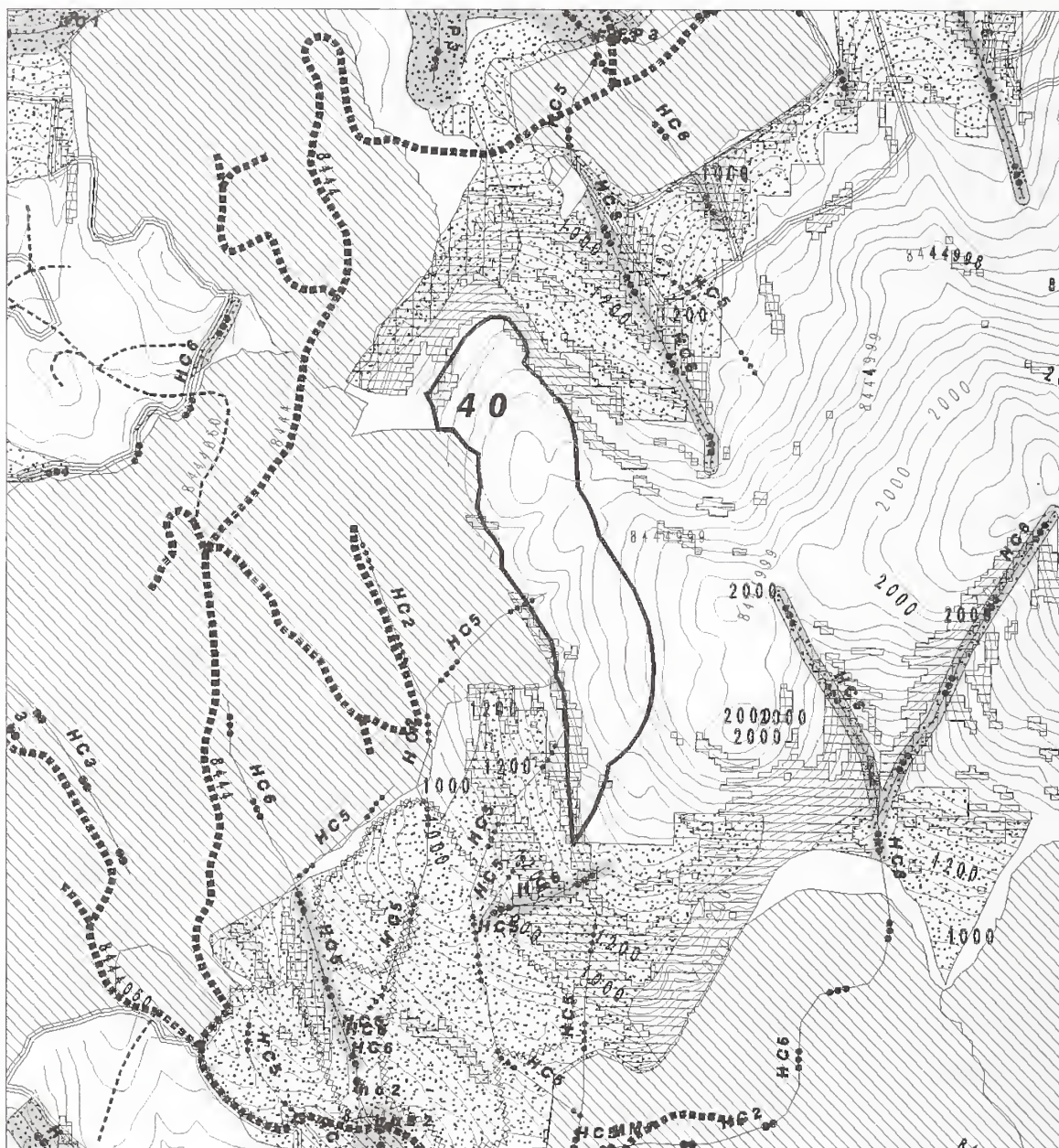
**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).

## Licking Creek Draft EIS Unit: 40

39 Acres in Alternatives: 3 4 5

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0 0.1 0.2 Miles  
mapscale 1: 12000



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	40	Planned Unit Acres:	39	Silvicultural Prescription:	CC EACCR	In Alternatives:	3, 4, 5
LUD:	ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Helicopter	Total Estimated Harvest Volume (CCF):		1,728	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Timber will be harvested by helicopter to Road 8444000. See road card in Appendix B.

**FISH/WATERSHED:**

Class IV HC5 Center to West (2 each): Fall trees away from stream course; split yarding or partial suspension is required. F3, F4

Class III HC6 Southwest: Sideslope Standard & Guideline or RMA (top of V-notch) buffer is required. F1, F2

Class III HC6 Northeast: Sideslope Standard & Guideline or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No significant karst features nor expression of well-developed epikarst was found on the carbonate portion of the unit. The vulnerability of the karst systems in this unit is low to moderate. The soils are thinner towards the top of the knobs on the landscape. To minimize soil disturbance during yarding, partial suspension is required (BMP 13.9).

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Unit sits on ridgetop in the middleground of a Modified Landscape LUD. The visual quality objective is Modification. Roughly the northern 2/3 of unit lies directly above an old unit harvested about 25 years ago that sits on a steep slope facing Carroll Inlet. The backline of this unit is still clearly evident. Harvest as many trees as possible down to this old clearcut to remove impact of backline. Southern 1/3 of unit is on steeper slopes. Retain enough forested texture in this stand so as not to add to the impact of the extensive old harvest that is still highly visible on the slopes below Unit 40, and a Madder sale unit that will be visible. Recommend retaining about 30% of the southern 1/3 of unit. V4

**SILVICULTURE:**

Vegetation: This stand lies above a managed stand, harvested in 1974, that borders along the west side. Topography is irregular with areas of steep slopes present. Plant associations are varied, including these plant association types: mountain hemlock, Sitka spruce-mountain hemlock, western hemlock and mixed conifer. Windthrow potential is moderate to high throughout, particularly in the south part of the stand.

Stand Management Objective: The southern 1/3 of the unit, where scenery is a concern, will be managed as even-aged with windfirm reserve clumps and scattered trees. The northern 2/3 of the unit will be even-aged. Regeneration through release of established stems and new seedlings is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is even-aged clearcut with reserves in the southern 1/3 of the unit. Leave 20-30% of the stand structure, scattered and/or clumped throughout areas of visual concern in southern portion of the unit. Apply a clearcut prescription to the rest of the unit (northern 2/3). This prescription will reduce mistletoe, maximize economic return, and minimize risk of windthrow. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

No resource concerns were identified during an on-site investigation.

**TIMBER:**

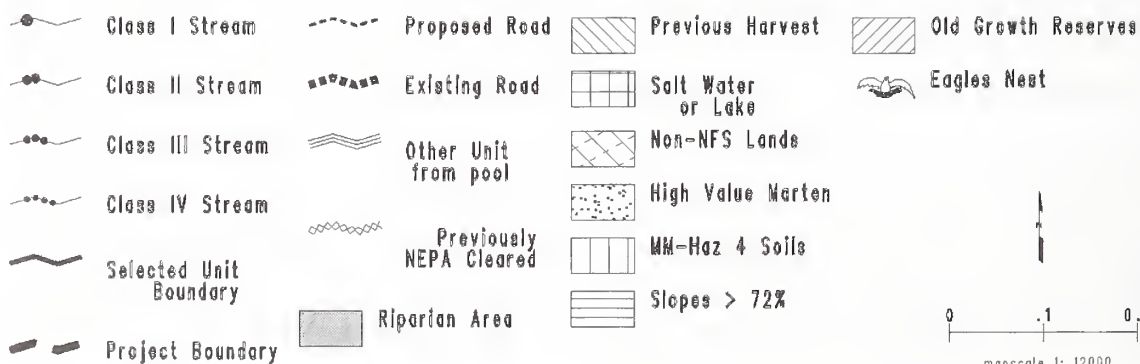
This unit is designed for helicopter yarding.

**WILDLIFE:**

There are less than 2 acres of high-value marten habitat within the unit; therefore, Marten Standards and Guidelines do not apply in this unit.



**Licking Creek Draft EIS Unit: 43**  
 71 Acres in Alternatives: 4



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	43	Planned Unit Acres:	71	Silvicultural Prescription:	CC	In Alternatives:	4
LUD:	ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable and Shovel	Total Estimated Harvest Volume (CCF):			3,024

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. See road card in Appendix B. Road 8444060 is new construction and accesses entire unit. Short temporary roads may be necessary. Road 8444060 begins at an intersection with Road 8444000. Road construction is moderate to easy. No sections of road are on steep sideslopes. Road crosses a muskeg wetland in the center of the unit (which is excluded from timber harvest).

**FISH/WATERSHED:**

Class III HC6 South: Sideslope Standard & Guideline or RMA (top of V-notch) buffer is required. F1, F2

Class II HC3 North: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

This unit encompasses two small knobs which are visible from several viewpoints along Carroll Inlet. Very little visible backline edge will be created. This unit will contribute to meeting the Modification Visual Quality Objective that applies to this area.

**SILVICULTURE:**

Vegetation: Stand has very irregular topography: areas of steep, even slopes in the north, knobs, rolling terrain, and a couple of draws in the southern 2/3 of stand. The northern 1/3 is the most productive site with a western hemlock-dominated overstory and occasional Sitka spruce. The rest of stand is low to moderately productive with western hemlock dominating the overstory with pockets of red and yellow cedar. Windthrow potential is low to moderate throughout the stand. Mistletoe infections are present throughout in moderate to severe infections, particularly in the lower 1/2 of crowns. One area of severe yellow cedar decline was found. Stand is surrounded on 3 sides by managed stands: The eastern managed stand was harvested in 1990. The other managed stand was harvested in 1974.

Stand Management Objective: Stand will be even-aged with areas of windfirm reserve clumps and scattered trees. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Apply a clearcut prescription. There are two areas of high-value marten habitat within the unit: in the southwest corner and in the northern area. Maintain 10-20% of the stand structure in these areas. This prescription will reduce mistletoe, maximize economic return, and minimize risk of windthrow. If possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: The results of an on-site stability investigation determined that unit contains small inclusions of slopes greater than 72%, totalling less than an acre which showed no evidence of slumping or mass movement. Therefore, no specific harvest guidelines are recommended.

**TIMBER:**

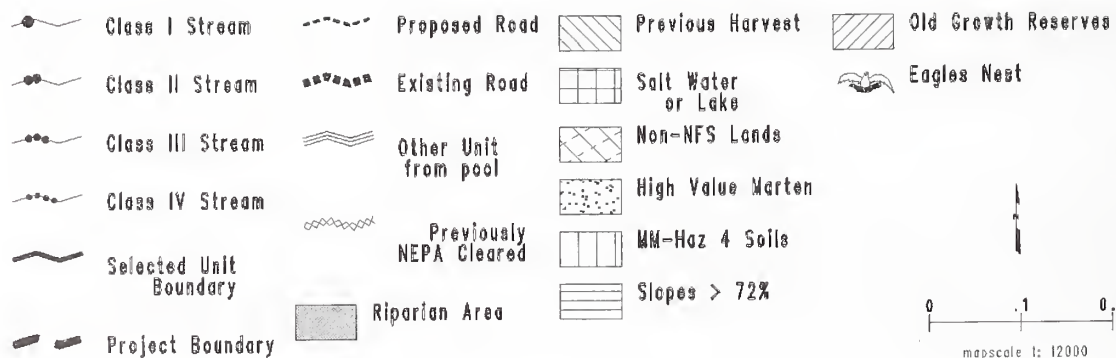
This unit is designed for a combination of shovel, short and long-span cable yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 44 33 Acres in Alternatives: 4





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	44	Planned Unit Acres:	33	Silvicultural Prescription:	EACCR	In Alternatives:	4
LUD:	ML	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable and Shovel	Total Estimated Harvest Volume (CCF):			1,442

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. See road cards in Appendix B. Road 8444051 is new construction and accesses entire unit. The road begins at the terminus of Road 8444050. Construction is moderate to easy. If steep sideslopes greater than 67% are found, excavation will be endhauling.

**FISH/WATERSHED:**

Class II MC3/HC3 East: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

Class II HC2 Southwest: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Unit in foreground seen area of Modified Landscape LUD. Visual Quality Objective is Partial Retention. Unit sits on top of knob and along ridgetop. Top of knob and ridge may be slightly visible in places. Landings at end of Road 8444051 may be visible. Avoid concentration of logging slash in one spot along this end of the road. There are no other unit design concerns. V10

**SILVICULTURE:**

Vegetation: Stand covers a knob in the north and stretches south along a finger ridge. The east border follows along a stream draw. On the other side of the stream draw is a managed stand that was harvested in 1974. The west boundary lies along a muskeg system. The northwest boundary is adjacent to a managed stand that was harvested in 1962. The east side of the finger ridge is a moderately high-volume western hemlock forest. It transitions to a western hemlock-western red cedar forest type to the west and a mixed conifer forest type in the south 1/3 of the stand. Stand development stage is old growth. Windthrow potential is low. Mistletoe infections were present throughout but in minor severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: The results of an on-site stability investigation determined that unit contains small inclusions of slopes greater than 72% associated with the knob in the northern end of the unit. Most of the slopes greater than 72% in the northeast section of the unit will be placed in deferral. In the northwestern end of the unit, there is about 1/4 acre of slopes of 90%. Partial suspension is required in this area to protect McGilvery soils (BMPs 13.2 and 13.9).

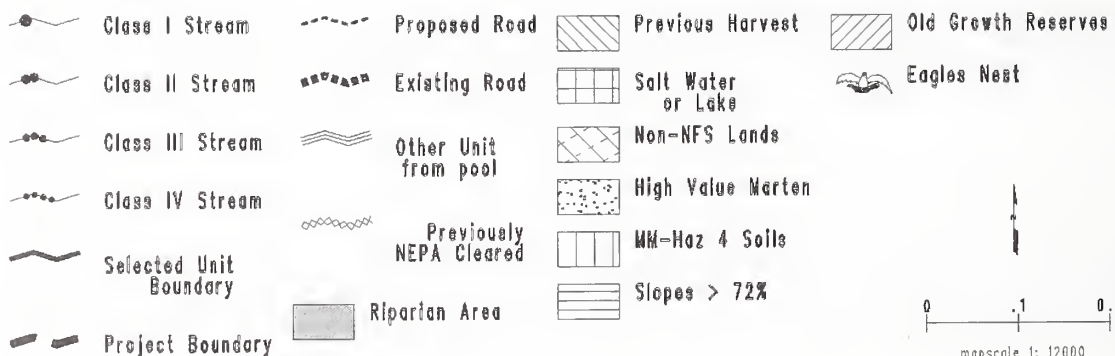
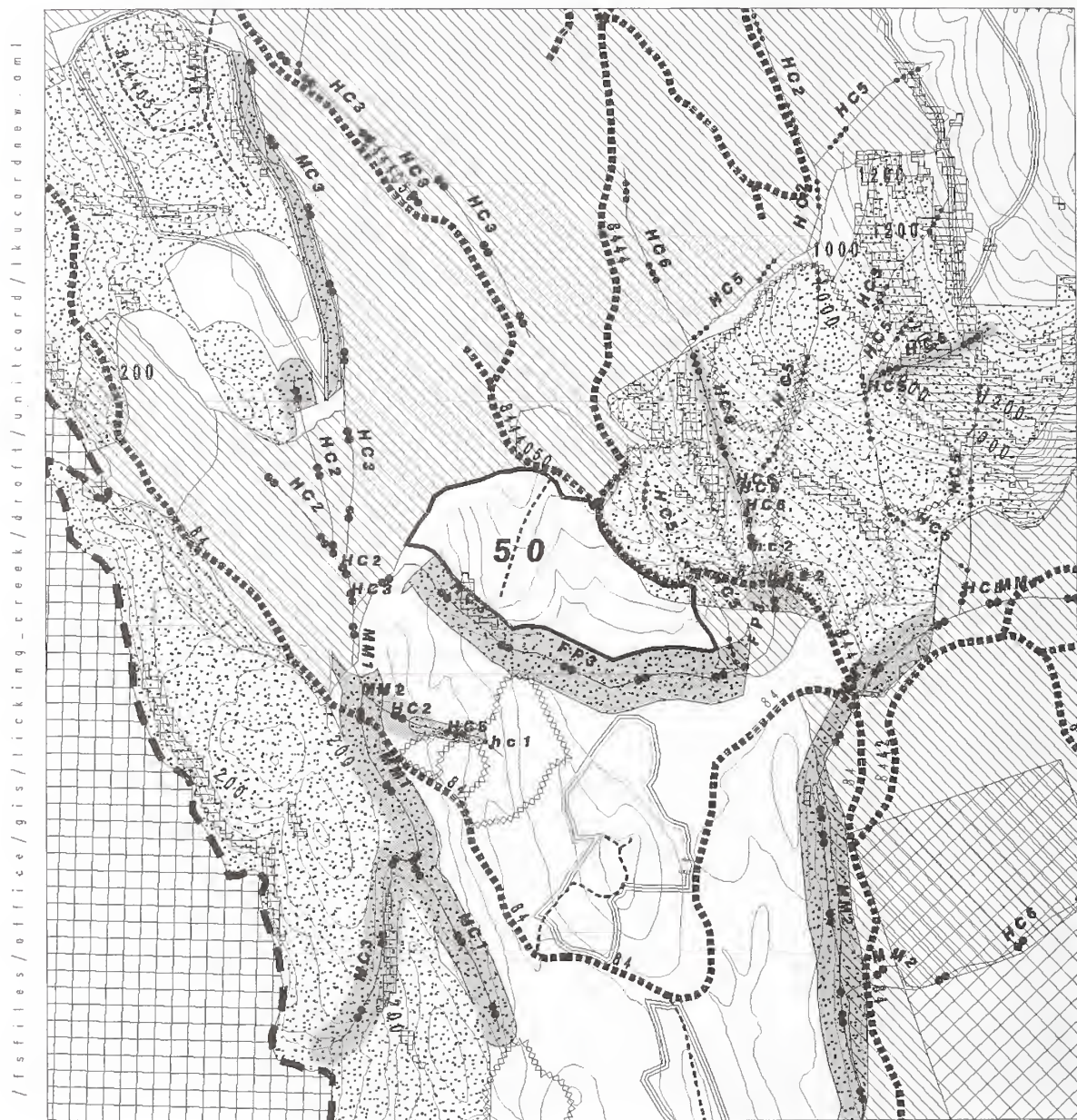
**TIMBER:**

This unit is designed for a combination of shovel and cable yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).

**Licking Creek Draft EIS Unit: 50**  
 28 Acres in Alternatives: 4 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	50	Planned Unit Acres:	28	Silvicultural Prescription:	CC	In Alternatives:	4, 5
LUD:	ML, TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable and Shovel	Total Estimated Harvest Volume (CCF):			1,252

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is needed to access this unit; however a short, temporary spur road could be constructed under Alt. 4. For Alt. 5, unit will be harvested from existing road or helicopter yarded to Road 8444000.

**FISH/WATERSHED:**

Class IV HC5 East: Split yarding or partial suspension is required (BMP 13.16 and CT6.51c). F3, F4

Class II FP3 South: Greater of 130-foot or floodplain RMA buffer is required. F1, F2

Class II HC3 West: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Unit is visible along with Units 40 and 43 and uncut Madder units. However, unit will contribute to meeting Modification Visual Quality Objective as past harvest regenerates.

**SILVICULTURE:**

Vegetation: Stand has rolling, irregular topography. Overstory is dominated by western hemlock with some Sitka spruce and western red cedar. Understory is dominated by devil's club and blueberry. Windthrow potential is moderate throughout. Mistletoe infection is present throughout the entire stand in minor to moderate infections. The stand is bordered along the northwest and east by managed stands harvested in 1974. Along the northeast boundary is a Madder timber sale unit that has not yet been harvested.

Stand Management Objective: Stand will be even-aged. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Apply a clearcut prescription. This will reduce mistletoe and remove highly defected trees, maximize economic return, and minimize risk of windthrow. If possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: No slopes greater than 72% were found. If slopes greater than 72% are found, place in deferral or delete from unit unless the results of an on site visit by a soil scientist determine the area appropriate for harvest.

**TIMBER:**

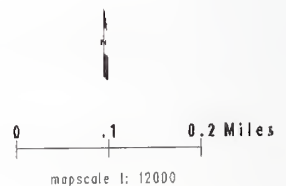
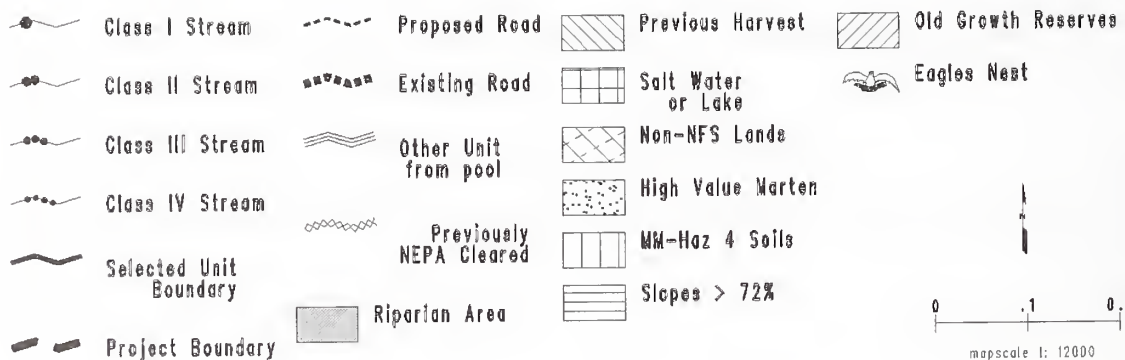
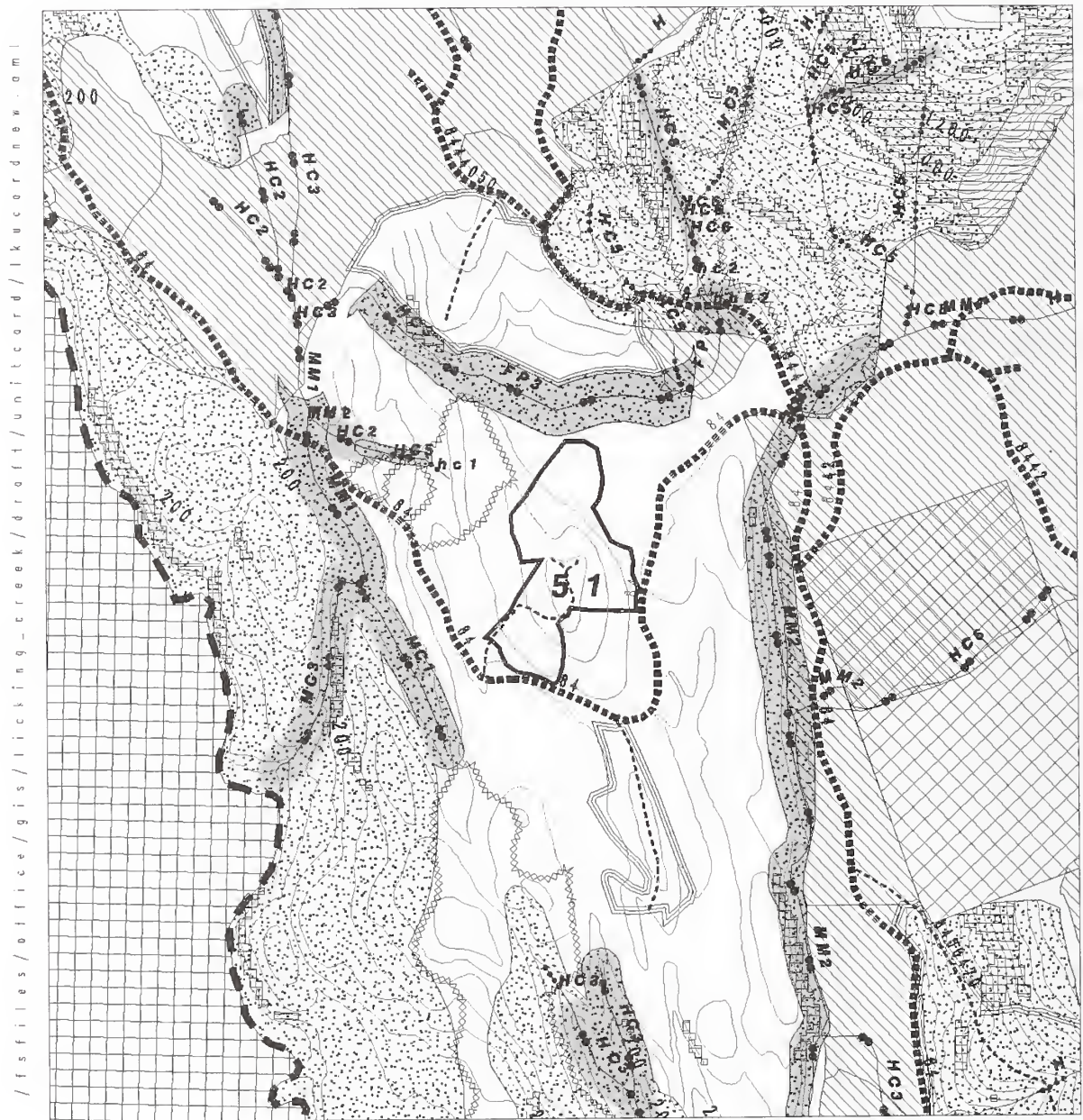
This unit is designed for a combination of shovel and short-span cable. For Alternative 5, the unit is designed for a combination of shovel and helicopter yarding.

**WILDLIFE:**

There are less than 2 acres of high-value marten habitat within the unit; therefore, Marten Standards and Guidelines do not apply in this unit.



## Licking Creek Draft EIS Unit: 51 17 Acres in Alternatives: 4



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	51	Planned Unit Acres:	17	Silvicultural Prescription:	CC	In Alternatives:	4
LUD:	ML, TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74604
		Logging Systems:	Cable		Total Estimated Harvest Volume (CCF):		616

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is needed to access this unit.

**FISH/WATERSHED:**

No resource concerns were identified.

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is low lying, has gentle slopes, open canopy, and is bordered by several muskegs. Forest type varies from mixed conifer plant association to western hemlock-western red cedar/ blueberry. Windthrow potential is low to moderate. Cedar decline and mistletoe are present throughout the stand and vary in severity from minor to severe. Stand defect is high, especially in the western red cedar.

Stand Management Objective: Stand will be even-aged. Natural regeneration is expected to be abundant but should be monitored after harvest due to the lower site productivity. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Apply a clearcut prescription. This will reduce mistletoe and remove highly defected trees, maximize economic return, and minimize risk of windthrow. If possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber along the edges of bordering muskegs.

**SOILS:**

No resource concerns were identified.

**TIMBER:**

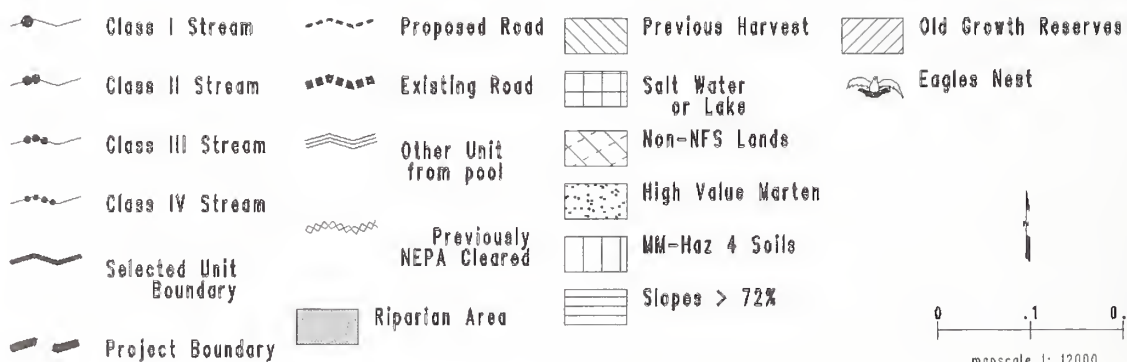
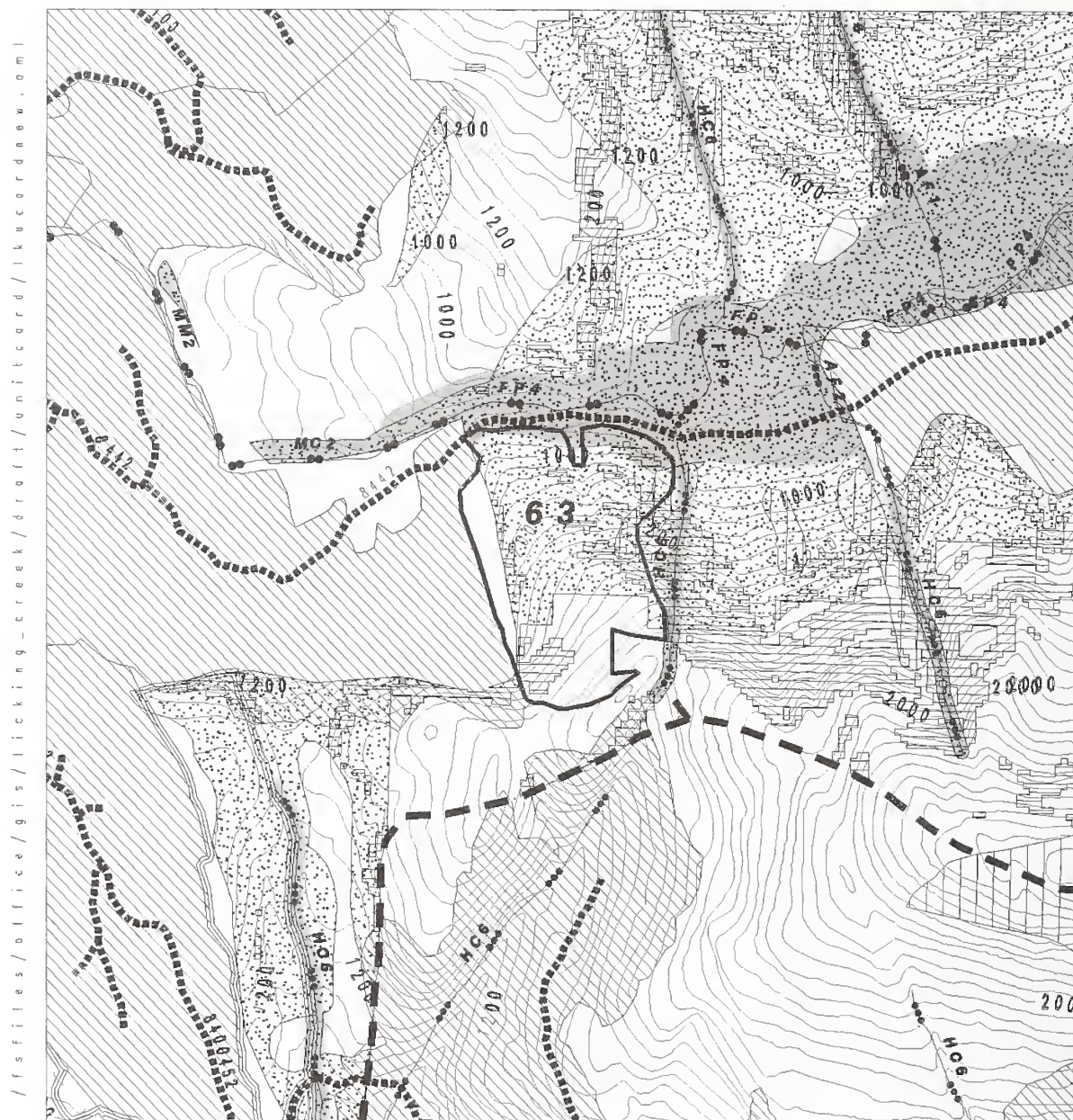
This unit is designed for short-span cable yarding.

**WILDLIFE:**

No resource concerns were identified.



## Licking Creek Draft EIS Unit: 63 39 Acres in Alternatives: 2 3 4 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	63	Planned Unit Acres:	39	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74605
Logging Systems:		Helicopter		Total Estimated Harvest Volume (CCF):		1,708	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Logs will be helicopter yarded to Road 8442000. See attached road card in Appendix B. No new roads will be constructed to harvest this unit.

**FISH/WATERSHED:**

Class II FP4 North: Greater of 130-foot or floodplain RMA buffer is required. F1, F2

Class III HC6 East: Sideslope Standard and Guideline or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Unit is located on a north-facing slope adjacent to Marble Creek, about 3 miles upstream from saltwater. It is partially visible from some viewpoints in Carroll Inlet between the mouths of Marble Creek and Calamity Creek. It is in the middleground seen area of a Timber Production LUD. The Visual Quality Objective is Maximum Modification. There are no concerns with location or design of unit. V1

**SILVICULTURE:**

Vegetation: Stand is varied, with western hemlock, yellow-cedar, Sitka spruce, and mountain hemlock in the overstory. The aspect is north/northwest and as a result, the stand displays low windthrow potential and gap phase disturbance dynamics. It is bordered to the west by a managed stand, harvested in 1974. Marble Creek and an old road border the stand on the north. No yellow cedar decline was present and mistletoe infections were found in only one area and were minor in severity.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, in the areas of the unit that contain high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain all unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: The GIS database indicates slopes greater than 72% may be found within the unit; if this is ground verified, appropriate mitigation measures will be applied if necessary.

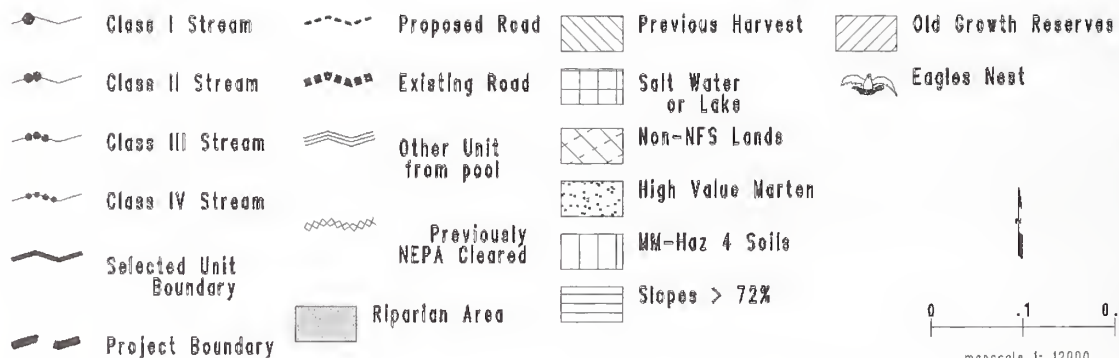
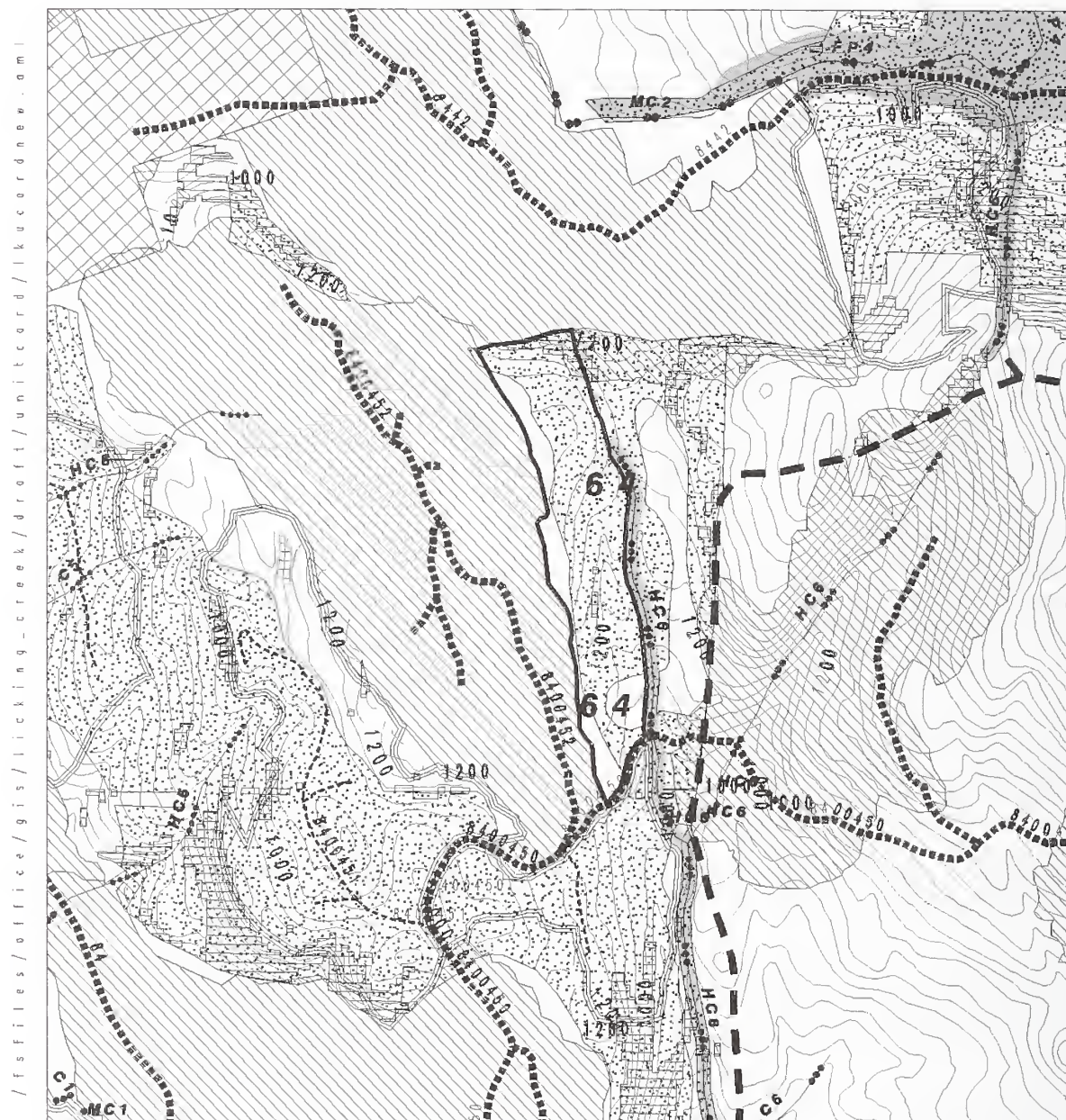
**TIMBER:**

This unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).

**Licking Creek Draft EIS Unit: 64**  
 24 Acres in Alternatives: 3 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	64	Planned Unit Acres:	24	Silvicultural Prescription:	EACCR	In Alternatives:	3, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74605
Logging Systems:			Helicopter and Cable	Total Estimated Harvest Volume (CCF):			1,036

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

Logs will be helicopter yarded to Road 8400450. See attached road card in Appendix B. No new roads will be constructed to harvest this unit. Portions of the unit will be harvested from existing Road 8400450.

**FISH/WATERSHED:**

Class III HC6 East: Sideslope Standard & Guideline or RMA (top of V-notch) buffer is required. F1, F2

**GEOLOGY:**

The karst resources with in the unit have a moderate to high vulnerability. The top of the ridge along the western portion of the unit and the northern 1/3 of the unit are of moderate vulnerability. The grouping of sinks and the cliffs just south of the northern 1/3 of the unit are of high vulnerability (because of the shallowness of the soils and slope) and will be excluded from consideration for harvest (BMPs 13.2 and 13.5). In the remainder of the unit, partial suspension is required (BMP 13.9).

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is a long, narrow unit that runs north-south. Its entire west border is adjacent to a managed stand that was harvested in 1988. To the southeast (but not bordering unit) lies a managed stand that was harvested in 1993. The overstory is a mix of western hemlock, Sitka spruce and yellow cedar. The northwest corner has had a heavy occurrence of windthrow due to harvested unit to west. Elsewhere, windthrow potential is moderate to low. Mistletoe is minor in only a few areas. Yellow cedar decline is also present but only in the south portion of the stand.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped in the areas of the unit that contain high-value marten habitat. Place reserve in areas of high-vulnerability karst. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: Avoid harvest on slopes greater than 72% unless unit is visited by a soil scientist and slopes greater than 72% are determined to be appropriate for harvest.

**TIMBER:**

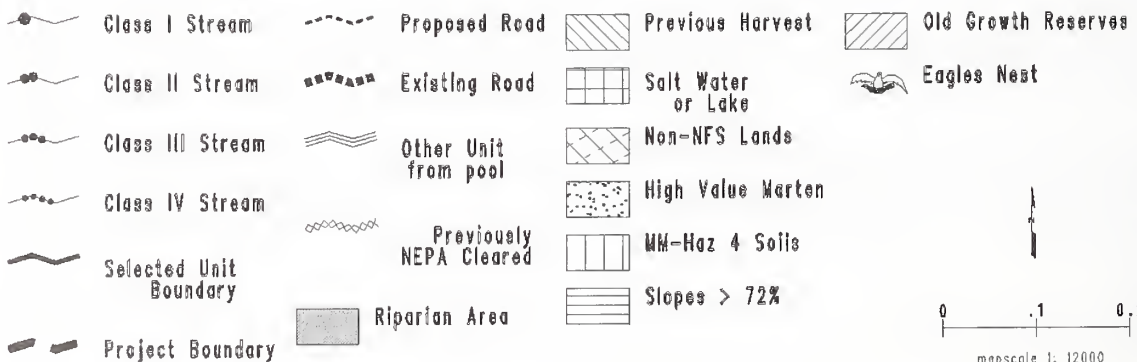
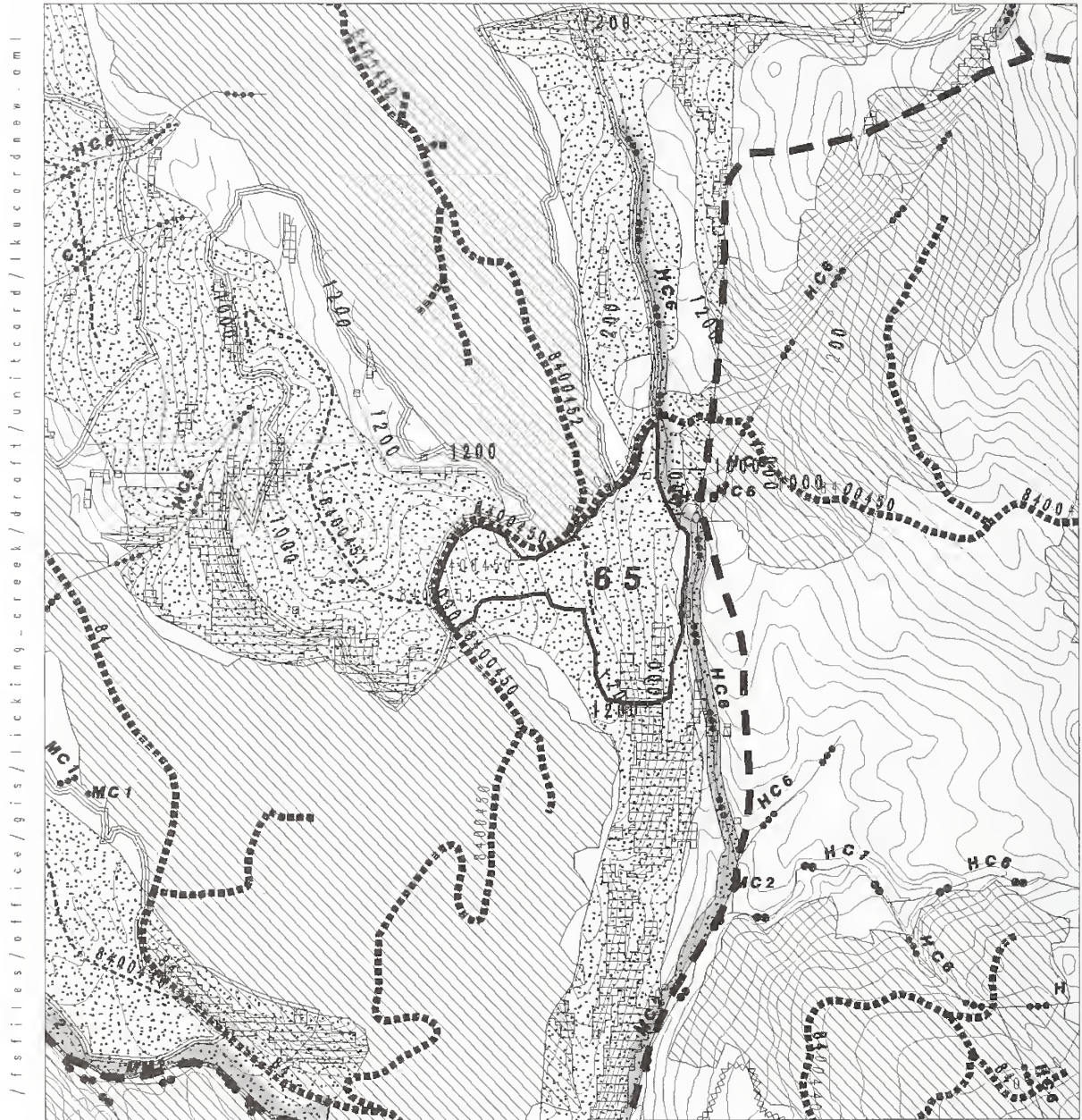
This unit is designed for helicopter yarding in the northern portion and long-span cable in the southern portion.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 65 26 Acres in Alternatives: 3 4



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	65	Planned Unit Acres:	26	Silvicultural Prescription:	EACCR	In Alternatives:	3, 4
LUD:	TM	Primary WAA Number:	406	Quad:	KTNB4NW	VCU Number:	74605
		Logging Systems:	Cable and Shovel	Total Estimated Harvest Volume (CCF):			1,148

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is needed to harvest this unit. Unit can be harvested from existing Road 8400450. See road card in Appendix B.

**FISH/WATERSHED:**

Class III HC6 East: Sideslope Standard and Guideline or RMA (Top of V-notch) buffer is required. F1, F2.

**GEOLOGY:**

The karst resources within the unit have a moderate vulnerability. Partial suspension is required throughout the unit (BMPs 13.5 and 13.9).

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This unit borders two other Licking Creek units (64 and 71). Its central northwest boundary borders a second-growth area harvested in 1988. There is a rockpit located on the north-central boundary. An extensive second-growth stand, harvested in 1972, lies to the southwest of the unit. Overstory is dominated by multi-sized western hemlock and scattered Sitka spruce. Stand development stage is old growth with areas of blowdown and understory reinitiation occurring in the western half of the unit. Elsewhere, windthrow potential is low. Mistletoe is minor in areas of the unit.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, throughout the unit which consists of all high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain all unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands.

**SOILS:**

Slopes greater than 72%: The results of an on-site stability investigation determined that about 1/2 acre of 90% slopes are present in the southern end of the unit. Partial suspension is required in this area to protect potentially unstable soils (BMPs 13.2 and 13.9)

**TIMBER:**

This unit is designed for short-span cable and shovel yarding.

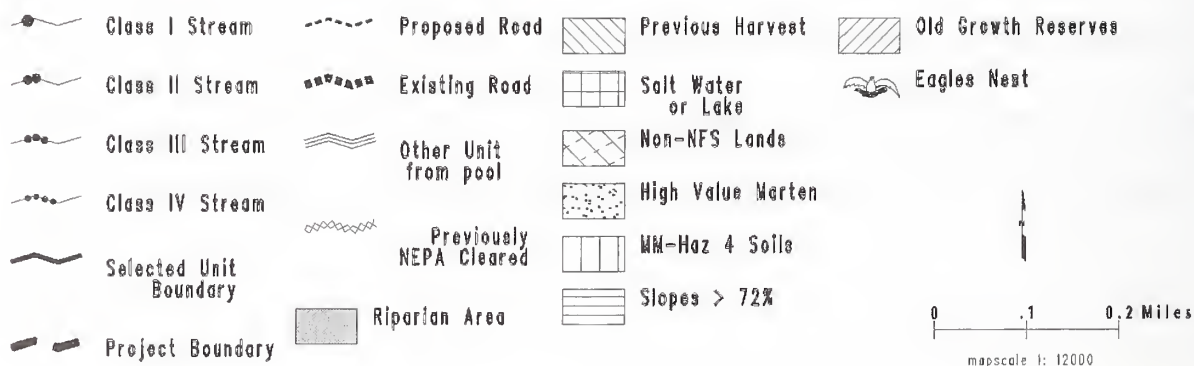
**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Appendix B

**Licking Creek Draft EIS Unit: 67**  
**55 Acres in Alternatives: 4 5**





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	67	Planned Unit Acres:	55	Silvicultural Prescription:	EACCR	In Alternatives:	4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74605
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			2,388

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Road 8400470 accesses unit. Road 8400470 begins at an intersection with Road 8400000. See road card in Appendix B. The road is easy to moderate construction. If sideslopes greater than 67% are found, then excavation will be endhailed. Road is located to avoid rockface and cross drainages at most desirable location. For Alt. 5 no new road construction will occur; all timber will be harvested from existing road or helicopter yarded to Road 8400000.

**FISH/WATERSHED:**

Class IV HC5 North: Fall trees away from streamcourse; split yarding or partial suspension is required (BMP 13.6 and CT6.5c). F3, F4

Class III HC3 Center West: Sideslope Standard and Guideline RMA (top of V-notch) buffer is required. F1, F2

Class IV HC5 South: Fall trees away from streamcourse; split yarding or partial suspension is required (BMP 13.6 and CT6.5c). F3, F4

**GEOLOGY:**

The karst resources within the unit have a moderate vulnerability. Partial suspension is required throughout the unit (BMPs 13.5 and 13.9).

**LANDS:**

No resource concerns were identified. Northern boundary of unit is adjacent to U.S. Coast Guard property.

**RECREATION/SCENERY:**

Unit sits on moderate to steep near-middleground slopes directly facing Carroll Inlet. The unit is in a Timber Production LUD. Therefore, the Visual Quality Objective is Maximum Modification. This unit is seen in conjunction with Unit 71 which is just to the south of and above Unit 67. Unit 67 needs to be broken up with a significant block of forested texture being retained, possibly on either side of the stream that runs through the middle of the unit. Also retain some clumps of leave trees in upper part of unit to reduce impact of backline. V1, V4

**SILVICULTURE:**

Vegetation: This is a multi-storied, old-growth western hemlock stand as a result of small-scale wind disturbance (gap phase dynamics). Mistletoe infections are present in minor severity throughout the stand. Understory is dominated by swordfern and devil's club. It is bordered to the west by an extensive second-growth stand harvested in 1972.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration through release of established stems is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, throughout the unit which consists of all high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter.

**SOILS:**

Slopes greater than 72%: There are about 2 ½ acres of slopes greater than 72% in the unit, most of which are in the western edge of the unit and will be placed in deferral for visual concerns. The remaining 1/2 acre not in deferral consists of small rock outcrops and unsustained slopes which showed no evidence of slumping or mass movement. Therefore, no specific harvest guidelines are recommended.

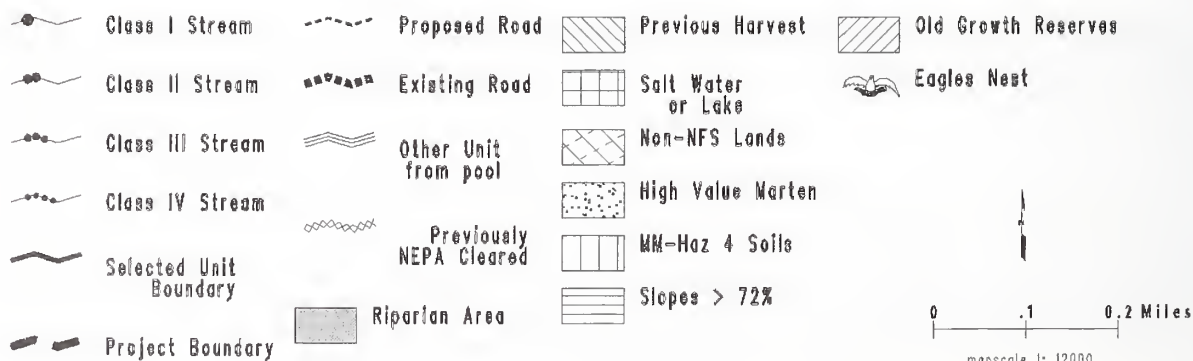
**TIMBER:**

This unit is designed for short-span cable yarding. For Alternative 5, the unit is designed for helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).

## Licking Creek Draft EIS Unit: 68 30 Acres in Alternatives: 2 3 4 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	68	Planned Unit Acres:	30	Silvicultural Prescription:	EACCR	In Alternatives:	2, 3, 4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNB4NW	VCU Number:	74605
		Logging Systems:	Cable and Shovel	Total Estimated Harvest Volume (CCF):			1,291

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. Unit is accessed by Road 8400445. See road card in Appendix B. Road construction is moderate to easy over length of road. Road location crosses no areas of steep sideslopes. For Alt. 5, no new road will be constructed; entire unit will be yarded to existing road or helicopter yarded to Road 8400000.

**FISH/WATERSHED:**

Class III MC1 Northeast: Sideslope Standard & Guideline RMA (top of V-notch) buffer is required. F1, F2

Class II MC1 Northwest: Greater of 100-foot or RMA (top of V-notch) buffer is required. F1, F2

Class II MM2 South and West: Greater of 120-foot or RMA (top of sideslope) buffer is required. F1, F2

Class II FP4 Northwest: Greater of 130-foot or floodplain buffer is required. F1, F2

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: This stand is an island of old growth surrounded on all sides by second growth. Harvest in the surrounding areas occurred in 1972-1973. The remaining forest that comprises Unit 68 has been influenced by wind. Windthrow has been widespread throughout the unit, resulting in an understory reinitiation stand structure. It is a productive site, dominated by western hemlock and scattered Sitka spruce. Understory vegetation is sparse in areas but is dominated by blueberry, devil's club and skunk cabbage.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, throughout the unit which consists of all high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain unmerchantable trees throughout the unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of the surrounding managed stands.

**SOILS:**

No resource concerns were identified.

**TIMBER:**

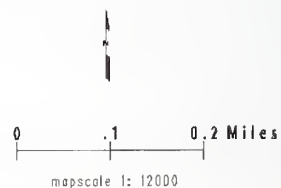
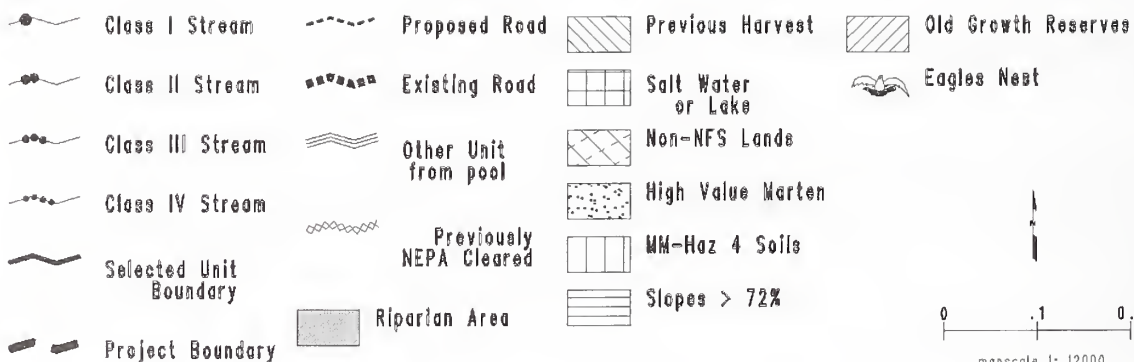
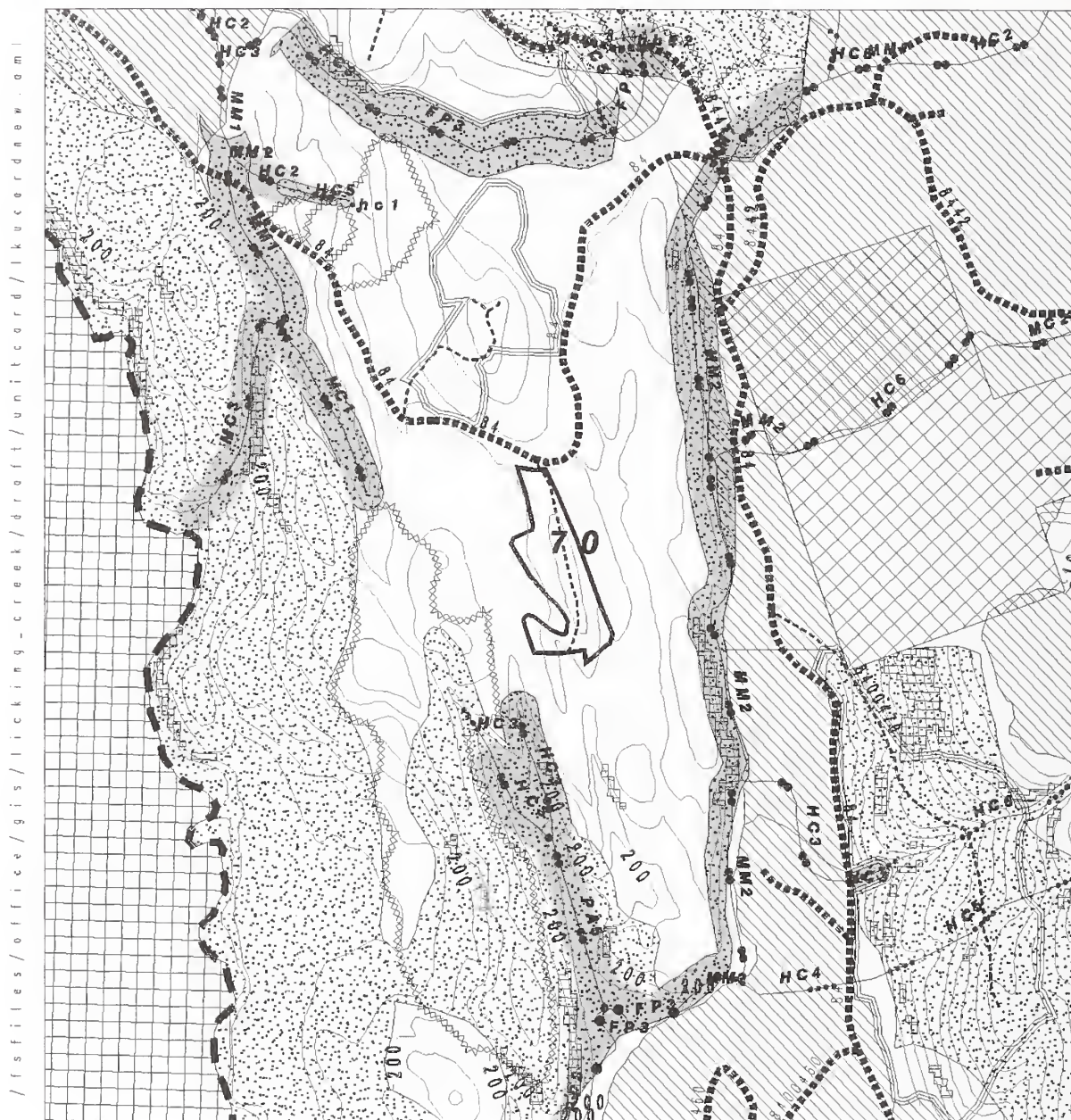
This unit is designed for shovel and short-span cable yarding. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



## Licking Creek Draft EIS Unit: 70 9 Acres in Alternatives: 2 3 4 5



## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	70	Planned Unit Acres:	9	Silvicultural Prescription:	CC	In Alternatives:	2, 3, 4, 5
LUD:	TM, ML	Primary WAA Number:	406	Quads:	KTNC4SW KTNB4NW	VCU Number:	74604
		Logging Systems:	Cable	Total Estimated Harvest Volume (CCF):			303

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

No resource concerns were identified. No new road construction is needed to harvest this unit.

**FISH/WATERSHED:**

No resource concerns were identified.

**GEOLOGY:**

No resource concerns were identified.

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Unit lies along a low ridge that bisects a large muskeg system. Forest type is dominated by mixed conifer plant association in the northern half that transitions to western hemlock-western red cedar plant association in the southern portion of the stand. There is high defect in many of the western red cedar trees. Yellow cedar decline is present throughout and is severe in the north 1/2 of unit. Windthrow potential is low.

Stand Management Objective: Stand will be even-aged. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Apply even-aged clearcut. This prescription will reduce stand disease, remove highly defected stems, maximize economic return and will minimize the risk of windthrow. Avoid isolating strips of timber along the muskeg edges.

**SOILS:**

No resource concerns were identified.

**TIMBER:**

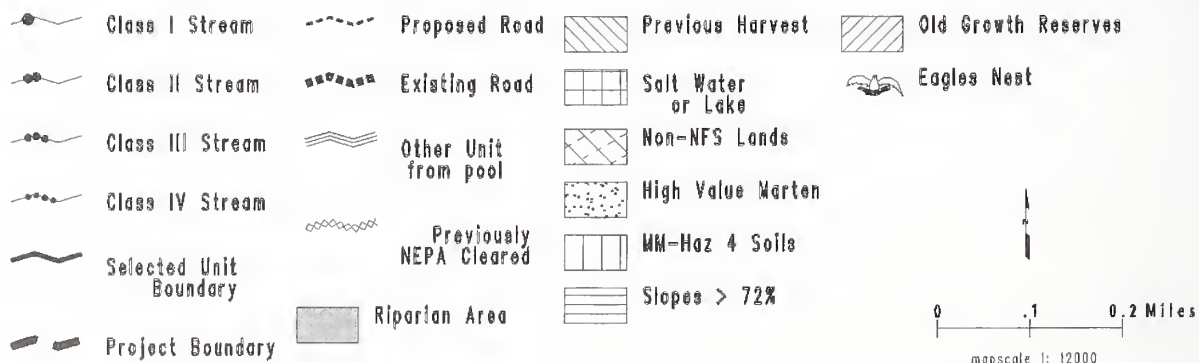
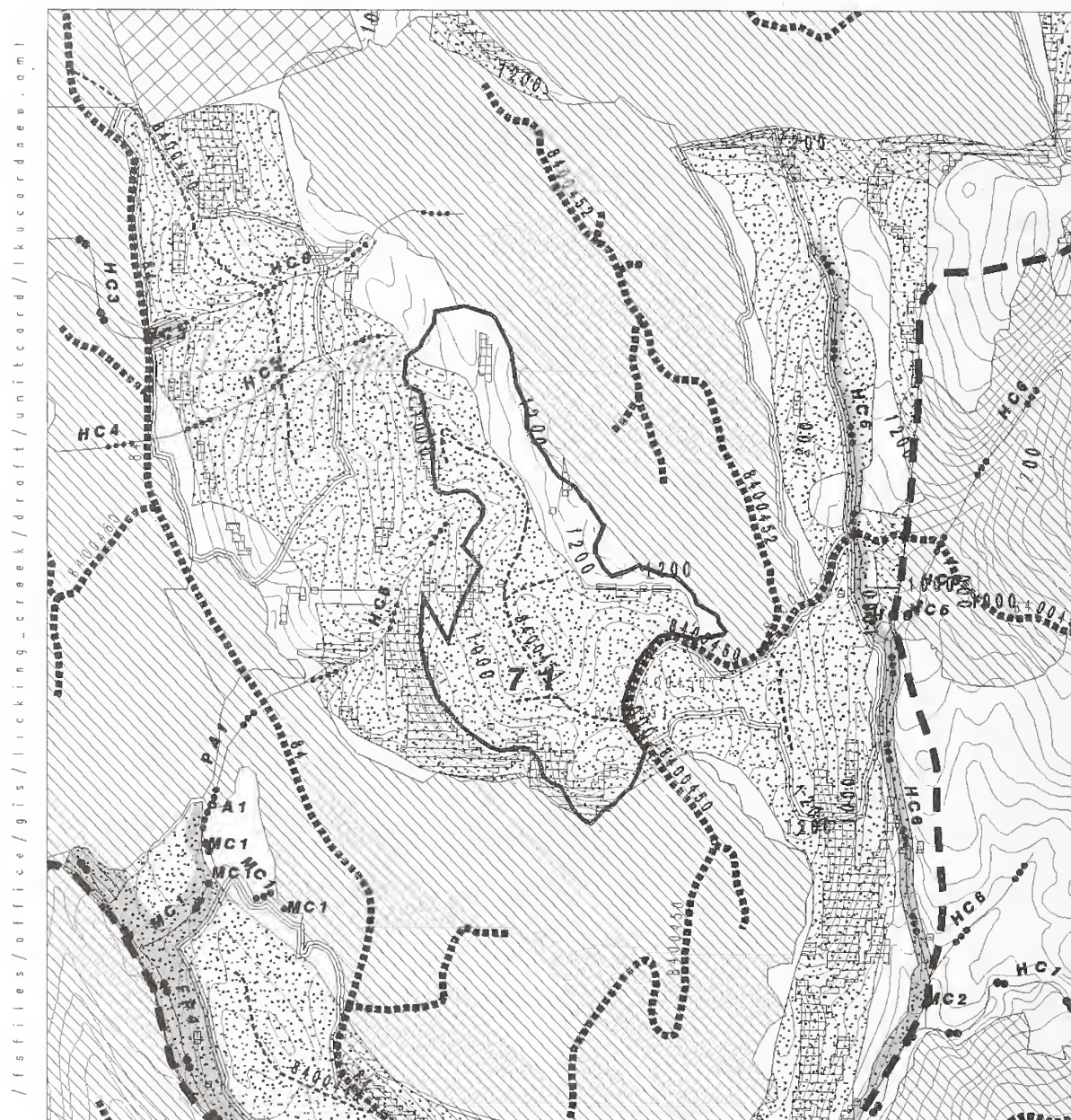
This unit is designed for short-span cable. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter yarding.

**WILDLIFE:**

No resource concerns were identified.



## Licking Creek Draft EIS Unit: 71 64 Acres in Alternatives: 4 5





## Unit Data Card – Licking Creek Timber Sale Draft EIS

Unit Number:	71	Planned Unit Acres:	64	Silvicultural Prescription:	EACCR	In Alternatives:	4, 5
LUD:	TM	Primary WAA Number:	406	Quad:	KTNC4SW	VCU Number:	74605
		Logging Systems:	Shovel and Cable	Total Estimated Harvest Volume (CCF):		2,807	

**HERITAGE RESOURCES:**

No resource concerns were identified. Avoid rock shelters and walk in caves. H1, H2

**ENGINEERING/ROADS:**

The road location for Road 8400451 was laid out by Engineering and Timber after consultation with other resource managers. The road begins at an intersection with Road 8400450 and was located to avoid steep cliffs and significant karst features. Road grades are under 10% and sideslopes greater than 30% are found only at the terminus of the road. Temporary roads are needed to access portions of the unit. See road cards in Appendix B. For Alt. 5, no new roads will be constructed; unit will be harvested by cable system to existing Road 8400450 or helicopter yarded.

**FISH/WATERSHED:**

Class IV HC5 West: Fall trees away from streamcourse; split yarding or partial suspension is required (BMP 13.6 and CT6.51c). F3, F4

**GEOLOGY:**

There are significant karst features of high vulnerability in this unit. This includes the sinks associated with the fracture, the sink field adjacent to the proposed road alignment and the resurgences. A minimum 100-foot, no-harvest buffer will be maintained surrounding these features and the road has been re-aligned to protect these features. The vulnerability of the karst systems in the remainder of the unit is low to moderate. The soils are thinner towards the top of the knobs on the landscape. To minimize the soil disturbance during yarding, partial suspension is required. (BMPs 13.5 and 13.9).

**LANDS:**

No resource concerns were identified.

**RECREATION/SCENERY:**

Only small portions of unit are visible from Carroll Inlet since it sits up on a gently sloping bench. Unit is in middleground seen area in a Timber Production LUD. This unit is seen in conjunction with Unit 67, which will be clearly visible. Visual Quality Objective is Maximum Modification. No resource concerns were identified.

**SILVICULTURE:**

Vegetation: Stand is an old-growth, multi-sized western hemlock stand. Overstory is dominated by western hemlock with occasional spruce and western red cedar. Topography is irregular throughout the unit with benches, spur ridges and several different aspects. Wind disturbance is moderate throughout the entire unit. It is adjacent to two managed even-aged stands, harvested in 1972 and 1988.

Stand Management Objective: Stand will be predominantly even-aged with windfirm reserve clumps and scattered trees where possible. Natural regeneration is expected to be abundant. Future treatments may include pre-commercial thinning at age 15-25 to promote tree growth and species diversity.

Treatment: Treatment is clearcut with reserves. Leave 10-20% of the stand structure, scattered and/or clumped, throughout the unit which consists of all high-value marten habitat. Reserve areas may be clumped to obtain windfirmness. Where possible, retain all unmerchantable trees throughout unit, particularly snags and near snags of large diameter. Avoid leaving isolated strips of timber between the borders of managed stands to the northeast and south of proposed unit.

**SOILS:**

Slopes greater than 72%: The results of an on-site stability investigation determined that there are about 2 1/2 acres of slopes greater than 72% in this unit. Partial suspension is required on slopes greater than 72% to minimize soil disturbance (BMPs 13.2 and 13.9).

**TIMBER:**

This unit is designed for short-span cable and shovel yarding. For Alternative 5, the unit is designed for a combination of short-span cable and helicopter yarding.

**WILDLIFE:**

Marten Standards and Guidelines apply: leave 10-20% of original stand structure, in areas of high-value marten habitat, averaging four large trees/acre (20-30" dbh), three snags/acre, and three large, downed trees/acre (20-30" dbh).



Skagit yarder; photo by Dave Fletcher

## Road Cards

The general measures described in Introduction to Appendix B, Unit and Road Cards, apply to all roads in the Licking Creek project. The source(s) of each general measure are listed after the measure in terms of individual Forest-wide Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, The Soil and Water Conservation Handbook). Measures with application to a particular road are listed on the individual road cards as Site-specific Design Criteria.

General Design Criteria and Elements are shown on the Road Management Objectives portion of the road cards and are defined as follows:

- Functional Class: Local (L), Collector (C), and Arterial (A) classifications
- Service Life: Long (L) or Short (S), Constant (C) or Intermittent (I), consistent with NEPA disclosure document
- Traffic Service Level: Traffic Service Level anticipated for the design (A, B, C, D) that takes into consideration the characteristics of the road and operating conditions

Operational Maintenance Levels incorporate traffic service levels, as indicated in the following definitions. Applicable maintenance levels for the project area are:

- Maintenance Level 1 (Traffic Service Level D): Roads are closed by barrier, bridge removal or organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities.
- Maintenance Level 2 (Traffic Service Level C): Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic would be minor, consisting of administrative uses.

AFRPR Status: Alaska Forest Resource Protection Regulations.

The road segments are described using kilometer posts as beginning and ending points. Lengths are given in both kilometers (km) and miles (mi). Road width is given in meters (m).



## Licking Creek Road Card Road 84 (8400000) - Existing



- |                                 |                           |
|---------------------------------|---------------------------|
| —●— Class I Stream              | — Selected Road           |
| —●●— Class II Stream            | ■ Wetland                 |
| —●●●— Class III Stream          | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream          | ■ Potential Slopes GT 65% |
| —+—+— Unit Pool Boundary        | ■ Fresh or Salt Water     |
| —+—+— Existing Road             | — Eagle's Nest            |
| —+—+— To Be Built Road          |                           |
| —+—+— Reconstruct Existing Road |                           |
| —+—+— Proposed Project Road     |                           |



Status - Existing

Contour Interval 200 Feet

Mapscale 1: 59902

0 0.2 0.4 Miles



Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>	
Licking Creek	Licking Creek	TP	
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>	
8400000	2, 3, 4, 5	Existing	
<b>Begin Kilometer Post</b>	<b>Length [kilometers (miles)]</b>	<b>Begin Termini (Kilometer Post)</b>	<b>End Termini (Kilometer Post)</b>
Licking Creek Project Area begins at KM 53.13	7.94 km (4.93 mi)	53.13	61.07
From Project Area to intersection with Road 8400420 (road to LTF) Kilometer Post 48.45	4.68 km (2.91 mi)	48.45	53.13

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
A	Long Term	C	Rock	4.3 m	Lowboy	Light truck	25 kph

**Intended Purpose/Future Use:** Uses include silvicultural activities and administrative use.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:** Road will be maintained to the level that a pickup truck traveling at 25 kph needs. This includes servicing all culverts and drainage structures, ditchlines and brushing.

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

**Travel Management Strategies:** Existing road serves the Coast Guard station personnel and is used for Forest Service administrative purposes.

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Maintain road for use by Coast Guard personnel performing their administrative duties, as well as Forest Service personnel. Keep ditchlines, culverts and other drainage structures properly maintained. Brush roads as required.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8400000

**Road Location:** This is an existing road and will require only minimal maintenance prior to use for road management.

**Wetlands:** Road management on the small portion of Road 8400000 that crosses wetlands and requires road maintenance will not further impact wetlands and will not change the existing footprint.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). During road maintenance activities, Wetlands Protection Measures (BMP 12.5) will be followed. Revegetation of Disturbed Areas (BMP 12.17) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. Road Access (BMP 14.20) and Access Management (BMP 14.22) will be implemented.

**Rock Pits:** Existing rock pits are located for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** During pre-haul and post-haul maintenance, all bare cut slope banks will be seeded. Pre-haul maintenance should include mitigation of the following: cut slope erosion at Milepost 27.7 needs to be seeded. Road slumping and settling is occurring in multiple places between Mileposts 24 to 28. At Milepost 28.4, the right shoulder of road is eroding from water running down road. Road is sloughing at Milepost 36. Ditch needs to be cleaned out and reshaped between Mileposts 24.5 and 37.

**Silviculture:** Keep road open to ensure access to units until they are certified as stocked as required by NFMA and to enable access to potential thinning units in the project area.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



## Road Management Objectives

### Stream Crossings

#### Road No. 8400000

**A.) M.P. 30.282** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.3' Substrate: Boulder Cobble  
Gradient Upstream: 11 Gradient Downstream: 14 Structure: CP Passage required: No Timing Dates: N/A

**B.) M.P. 31.437** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 2.6' Substrate: Sand/Gravel  
Gradient Upstream: 13 Gradient Downstream: 16 Structure: CP Passage required: Yes Timing Dates: 7 June-15 Aug.  
**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**C.) M.P. 31.556** AHMU: Class IV Channel Type: HC2 Channel Bedwidth: 2.3' Substrate: Cobble Gravel  
Gradient Upstream: 9 Gradient Downstream: 32 Structure: CP Passage required: No Timing Dates: N/A

**D.) M.P. 31.608** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 3.0' Substrate: Sand Gravel  
Gradient Upstream: 13 Gradient Downstream: 21 Structure: CP Passage required: Yes Timing Dates: 7 June-15 August

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**E.) M.P. 32.073** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.0' Substrate: Cobble Gravel  
Gradient Upstream: 57 Gradient Downstream: 19 Structure: CP Passage required: No Timing Dates: N/A

**F.) M.P. 33.831** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 5.6' Substrate: Boulder Cobble  
Gradient Upstream: 21 Gradient Downstream: 23 Structure: CP Passage required: No Timing Dates: N/A

**G.) M.P. 34.291** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 6.2' Substrate: Bedrock Cobble  
Gradient Upstream: 37 Gradient Downstream: 26 Structure: CP Passage required: No Timing Dates: N/A

**H.) M.P. 34.850** AHMU: Class II Channel Type: MM2 Channel Bedwidth: 34.3' Substrate: Sand Gravel  
Grad. Upstream: 6 Gradient Downstream: 4 Structure: perm. bridge Passage required: Yes Timing Dates: 7 June-15 Aug.

**Narrative:** This bridge already exists and may not require any additional instream work. If repairs or replacement are needed, then the timing window applies due to direct relationship with anadromous habitat downstream.

**I.) M.P. 35.162** AHMU: Class II Channel Type: MM1 Channel Bedwidth: 7.5' Substrate: Gravel Cobble  
Gradient Upstream: 6 Gradient Downstream: 7 Structure: CP Passage required: Yes Timing Dates: N/A

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002. This crossing is far enough upstream that it would have little to no influence on salmon located downstream.

**J.) M.P. 36.256** AHMU: Class II Channel Type: MM1 Channel Bedwidth: 13.3' Substrate: Gravel Cobble  
Gradient Upstream: 3 Gradient Downstream: 2 Structure: CP Passage required: Yes Timing Dates: N/A

**Narrative:** This crossing is far enough upstream that it would have little to no influence on salmon located downstream.

**K.) M.P. 36.267** AHMU: Class II Channel Type: MM1 Channel Bedwidth: 9.8' Substrate: Gravel Cobble  
Gradient Upstream: 3 Gradient Downstream: 2 Structure: CP Passage required: Yes Timing Dates: N/A

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002. Passage is for resident fish therefore no timing is required.

**L.) M.P. 36.969** AHMU: Class II Channel Type: HC5 Channel Bedwidth: 4.2' Substrate: Boulder Cobble  
Gradient Upstream: 34 Gradient Downstream: 32 Structure: CP Passage required: Yes Timing Dates: N/A

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**M.) M.P. 37.230** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.5' Substrate: Boulder Cobble  
Gradient Upstream: 26 Gradient Downstream: 42 Structure: CP Passage required: No Timing Dates: N/A

**N.) M.P. 37.359** AHMU: Class I Channel Type: HC2 Channel Bedwidth: 46.5' Substrate: Bedrock and Boulder  
Gradient Upstream: 7 Gradient Downstream: 1 Structure: perm. bridge Passage required: Yes Timing Dates: 7 June – 15 August if need to replace or repair.

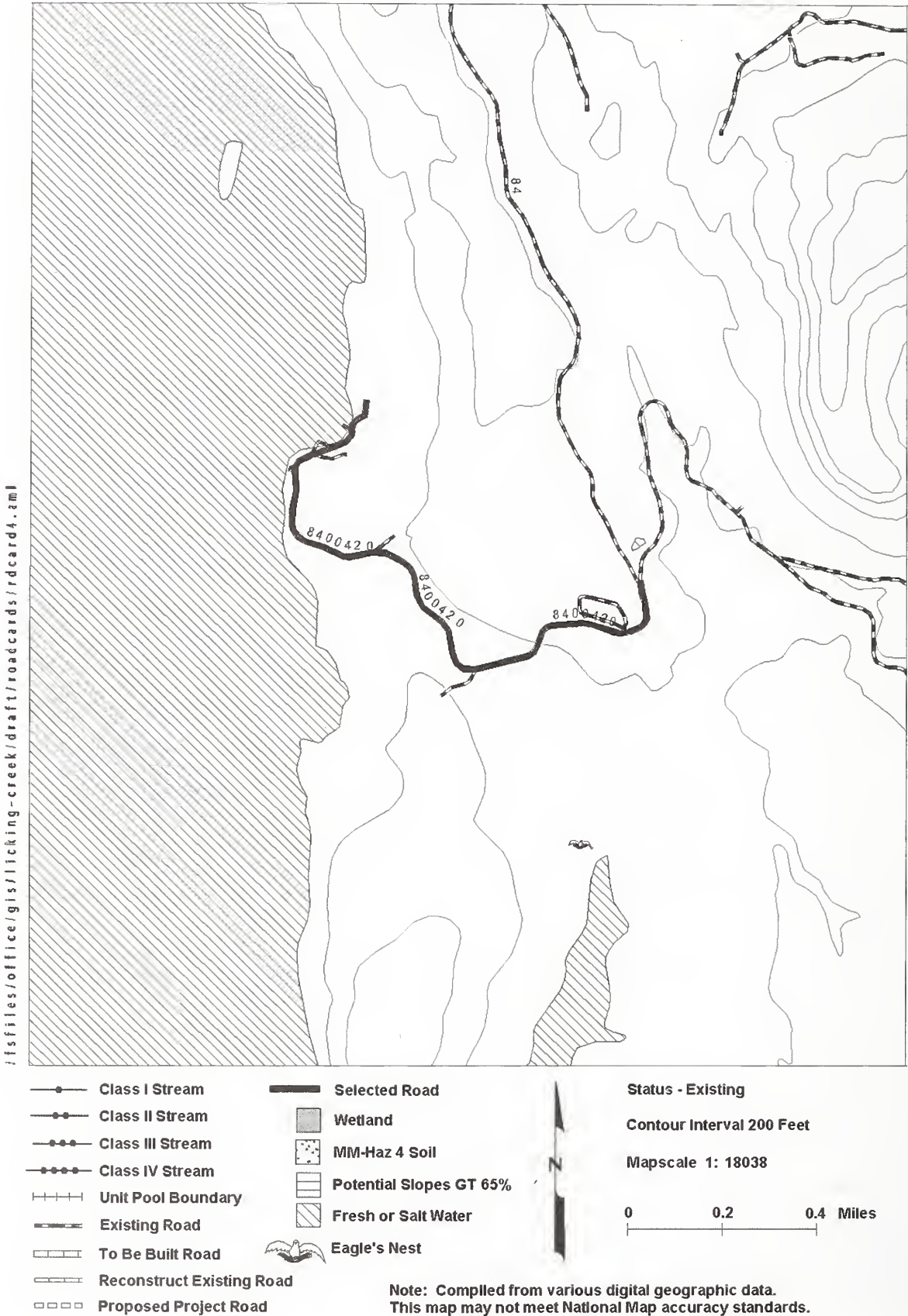
**O.) M.P. 37.631** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 8.2' Substrate: Boulder Cobble  
Gradient Upstream: 9 Gradient Downstream: 0 Structure: CP Passage required: Yes Timing Dates: N/A

**P.) M.P. 37.676** AHMU: Class II Channel Type: HC5 Channel Bedwidth: 4.8' Substrate: Boulder Cobble  
Gradient Upstream: 20 Gradient Downstream: 9 Structure: CP Passage required: Yes Timing Dates: N/A

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**Q.) M.P. 37.887** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.6' Substrate: Boulder Cobble  
Gradient Upstream: 34 Gradient Downstream: 41 Structure: CP Passage required: Yes Timing Dates: N/A

Licking Creek Road Card  
Road 8400420 - Existing



## Road Management Objectives

Project/EIS	System	Land Use Designation	
Licking Creek	Licking Creek	TP	
Route No.	In Alternatives	Status	
8400420	2, 3, 4, 5	Existing	
Begin Kilometer Post	Length [kilometers (miles)]	Begin Termini (Kilometer Post)	End Termini (Kilometer Post)
Road 8000420 begins at intersection with Road 8400000 at Kilometer Post 48.294	2.27 km (1.41 mi)	0.00	2.27

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	Long Term	C	Rock	4.3 m	Lowboy	Pickup truck	15 kph

**Intended Purpose/Future Use:** Uses include silvicultural activities and administrative use. This is the road to the LTF and the road is used by the Coast Guard personnel to access their docking facilities and station.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

**Travel Management Strategies:** This road is used extensively by Coast Guard personnel, and by the Forest Service for administrative uses.

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Road should be maintained to enhance safety and limit resource damage. Brushing, culvert cleaning, and road blading should be done periodically.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_



# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8400420

**Road Location:** This is an existing road and will require only minimal maintenance to meet Road Management Objectives.

**Wetlands:** Existing road does not cross wetlands.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8). During road maintenance activities, Wetlands Protection Measures (BMP 12.5) will be followed. Revegetation of Disturbed Areas (BMP 12.17) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. Road Access (BMP 14.20) and Access Management (BMP 14.22) will be implemented. Because the LTF is at the beginning of this road, Oil Pollution Control Measures (BMPs 12.8 and 12.9) will be closely followed. LTF Surface Erosion Control Plan (BMPs 14.26 and 14.27) will be followed.

**Rock Pits:** Existing rock pits are located for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** At Milepost 0.78, gravel is blocking ditch. At Mileposts 0.5-0.6 there is an inadequate ditch, diverting water on road. If maintenance is not done prior to sale, this will require pre-haul maintenance.

**Silviculture:** Keep road open following harvest to ensure access to units until they are certified as stocked as required by NFMA and to keep potential thinning opportunities viable.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

### Stream Crossings

#### Road No. 8400420

**A.) M.P. 0.559** AHMU: Class II Channel Type: MC1 Channel Bedwidth: 5' Substrate: Sand, Coarse Gravel, Organics

Gradient Upstream: 4 Gradient Downstream: 11 Structure: Existing CP Passage required: No Timing Dates: N/A

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**B.) M.P. 0.748** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 3' Substrate: Bedrock and Boulder

Gradient Upstream: 18 Gradient Downstream: 17 Structure: Existing CP Passage required: No Timing Dates: N/A

**C.) M.P. 0.849** AHMU: Class II Channel Type: HC5 Channel Bedwidth: 3' Substrate: Bedrock Boulder

Gradient Upstream: 12 Gradient Downstream: 19 Structure: Existing CP Passage required: Yes Timing Dates: N/A

**Narrative:** Inlet of culvert buried under rootwad and lip is bent. The Forest Service will conduct an Upstream Assessment at this site in 2002.

**D.) M.P. 1.335** AHMU: Class IV Channel Type: HC2 Channel Bedwidth: 4' Substrate: Bedrock and Boulder

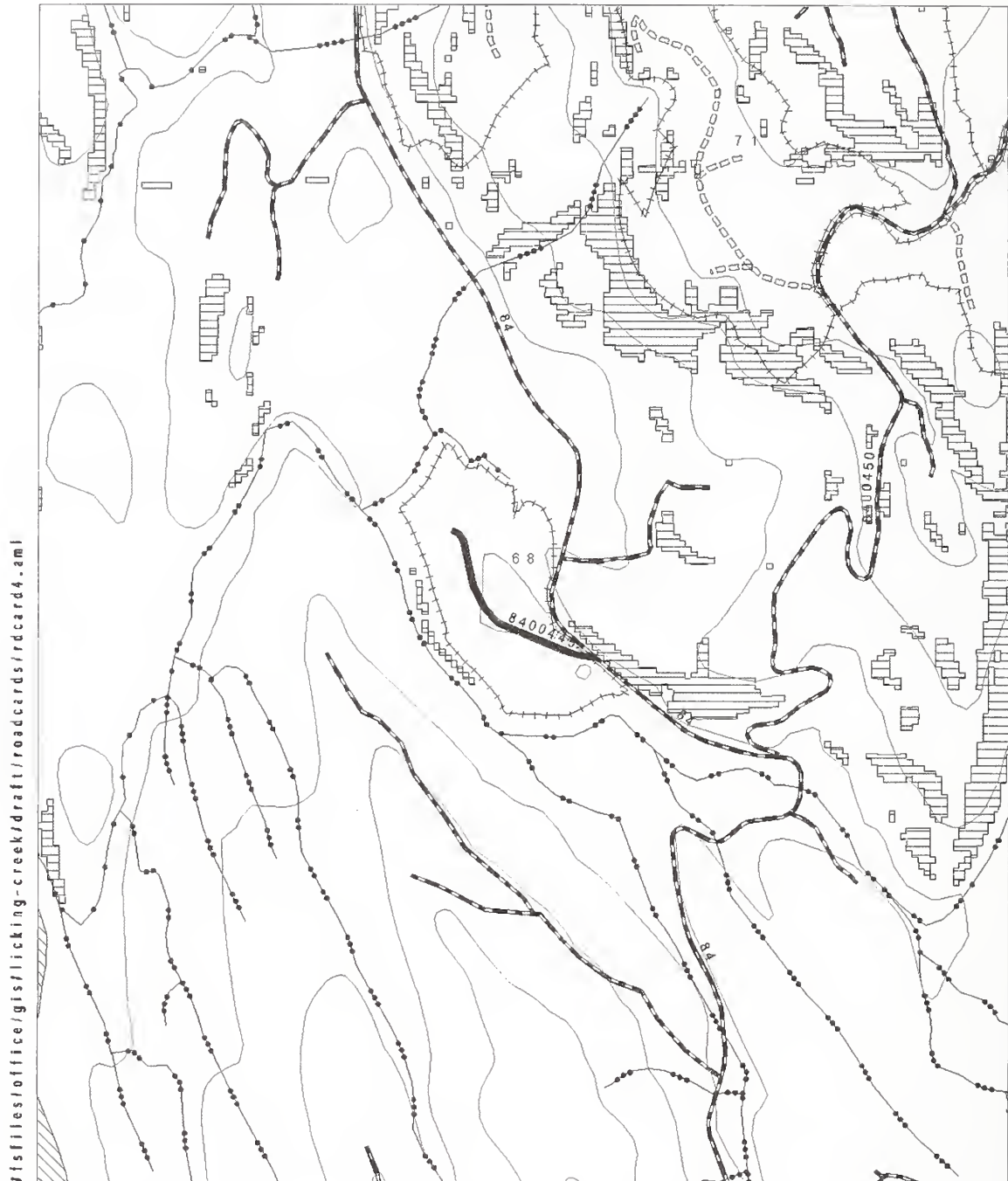
Gradient Upstream: 9 Gradient Downstream: 12 Structure: Existing CP Passage required: No Timing Dates: N/A

**Narrative:** Whole pipe dented.

**E.) M.P. 1.396** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 3' Substrate: Cobble Boulder, Bedrock

Gradient Upstream: 20 Gradient Downstream: 38 Structure: Existing CP Passage required: No Timing Dates: N/A

## Licking Creek Road Card Road 8400445 - Proposed



- |                             |                           |
|-----------------------------|---------------------------|
| —●— Class I Stream          | — Selected Road           |
| —●— Class II Stream         | ■ Wetland                 |
| —●— Class III Stream        | ■ MM-Haz 4 Soil           |
| —●— Class IV Stream         | ■ Potential Slopes GT 65% |
| ++++ Unit Pool Boundary     | ■ Fresh or Salt Water     |
| — Existing Road             | — Eagle's Nest            |
| — To Be Built Road          |                           |
| — Reconstruct Existing Road |                           |
| □ Proposed Project Road     |                           |

Status - Proposed

Contour Interval 200 Feet

Mapscale 1: 11951

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.



## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	TP
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8400445	2, 3, 4	New Construction
<b>Begin Kilometer Post</b>	<b>Length [kilometers (miles)]</b>	<b>Begin Termini (Kilometer Post)</b>
Road 8400445 begins at the intersection of Road 8400000 Kilometer Post 53.583	0.435 km (0.27mi)	<b>End Termini (Kilometer Post)</b> 0.435

### General Design Criteria and Elements

Functional Class	Service Life	Traffic Service Level	Surface	Width	Critical Vehicle	Design Vehicle	Design Speed
L	LI	D	Rock	4.3 m	Log truck	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8400445

**Road Location:** Road accesses Unit 68. Road construction should be moderate to easy over most portions of the road. Road is located to accommodate logging systems and still have the least impact on other resources. There are no sections where road location crosses steep slopes over 67 percent.

**Wetlands:** No crossing of wetlands is anticipated. Should wetland areas be identified during final layout, the road will be modified to avoid or minimize effects on wetlands, and appropriate standards will be applied (BMP 12.5).

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

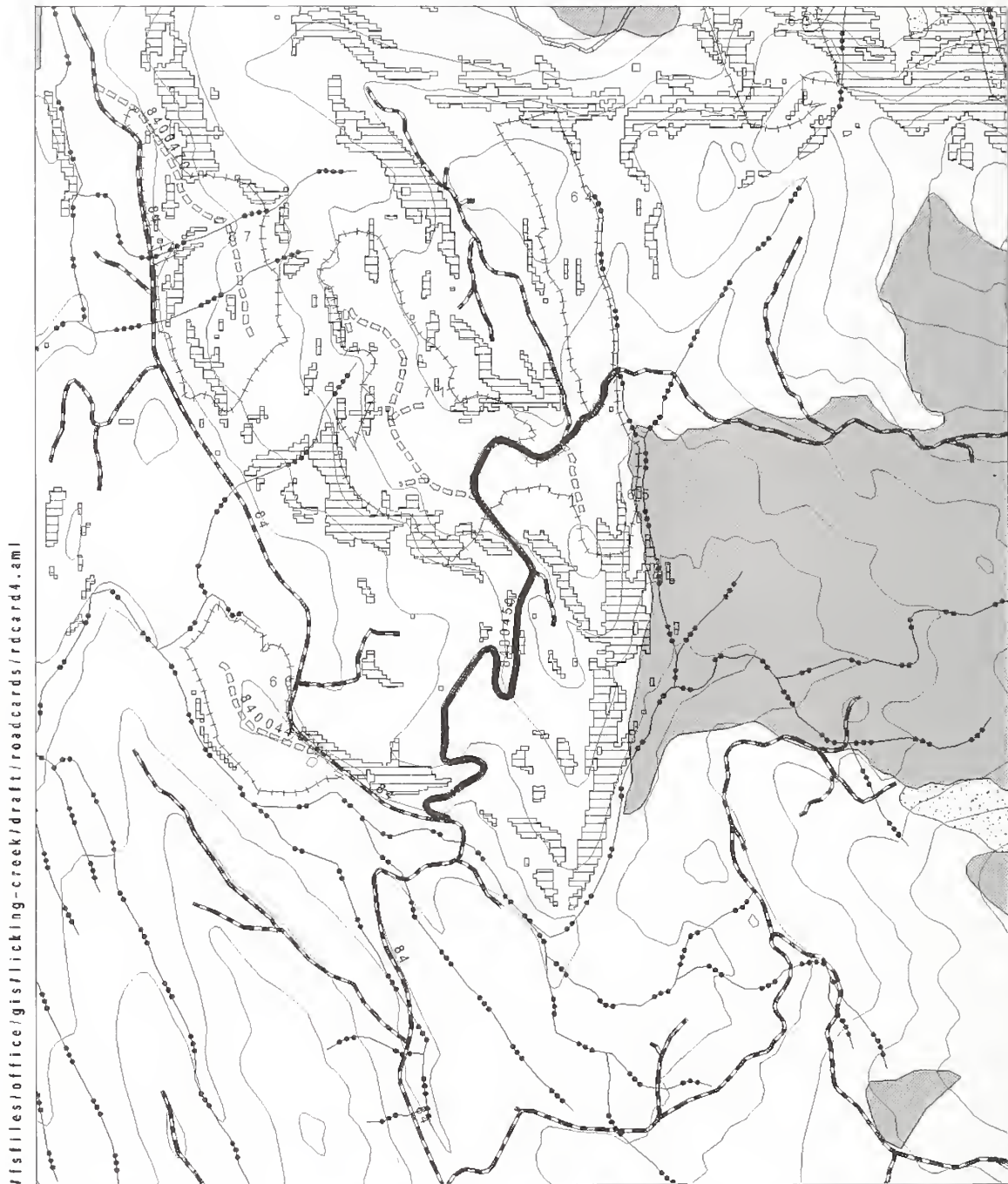
### Stream Crossings

#### Road No. 8400445

No streams are crossed on this road.



# Licking Creek Road Card Road 8400450 - Existing



- |                             |                           |
|-----------------------------|---------------------------|
| —●— Class I Stream          | — Selected Road           |
| —●●— Class II Stream        | ■ Wetland                 |
| —●●●— Class III Stream      | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream      | ■ Potential Slopes GT 65% |
| —+— Unit Pool Boundary      | ■ Fresh or Salt Water     |
| — Existing Road             | — Eagle's Nest            |
| — To Be Built Road          |                           |
| — Reconstruct Existing Road |                           |
| — Proposed Project Road     |                           |

Status - Existing

Contour Interval 200 Feet

Mapscale 1: 17268

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> TP
<b>Route No.</b> 8400450	<b>In Alternatives</b> 3, 4, 5	<b>Status</b> Existing
<b>Begin Kilometer Post</b>  Road 8400450 begins at the intersection with Road 8400000 Kilometer Post 53.15	<b>Length</b> <b>[kilometers (miles)]</b> 2.35 km (1.46 mi)	<b>Begin Termini</b> <b>(Kilometer Post)</b> 0.000
		<b>End Termini</b> <b>(Kilometer Post)</b> 2.35

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:** Prior to use for the Licking Creek project, road will require brushing, blading, ditchline cleaning, replacement of CMPs, and seeding.

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

**Travel Management Strategies:**

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Road is to remain open. Road maintenance will be kept current, brushing, culverts maintained, road graded and slide removal.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8400450

**Road Location:** Existing road requires minimal maintenance to achieve Road Management Objectives. During pre-haul maintenance, soils/water concerns will be addressed.

**Wetlands:** Existing road section does not cross wetlands.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). During road maintenance activities, Wetlands Protection Measures (BMP 12.5) will be followed. Revegetation of Disturbed Areas (BMP 12.17) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. Road Access (BMP 14.20) and Access Management (BMP 14.22) will be implemented.

**Rock Pits:** Existing rock pits are located for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Pre-haul maintenance should address cut slope erosion at 1.5 miles; bank needs seeding. Ditch is shallow between Milepost 0.07-0.67 and plugged intermittently from Milepost 0.07-1.46. At Milepost 0.8, there is a slide in the ditch. At Milepost 1.1, there are remnants of a snag plugging the ditch. At Mileposts 0.13, 0.24, 0.45, and 1.421, culverts are needed. Shoulder is sloughing between Mileposts 0.9 and 1.0.

**Silviculture:** Keep road open following harvest as to ensure access to units until they are certified as stocked and to keep potential thinning opportunities in the project area viable.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



## Road Management Objectives

### Stream Crossings

#### Road No. 8400450

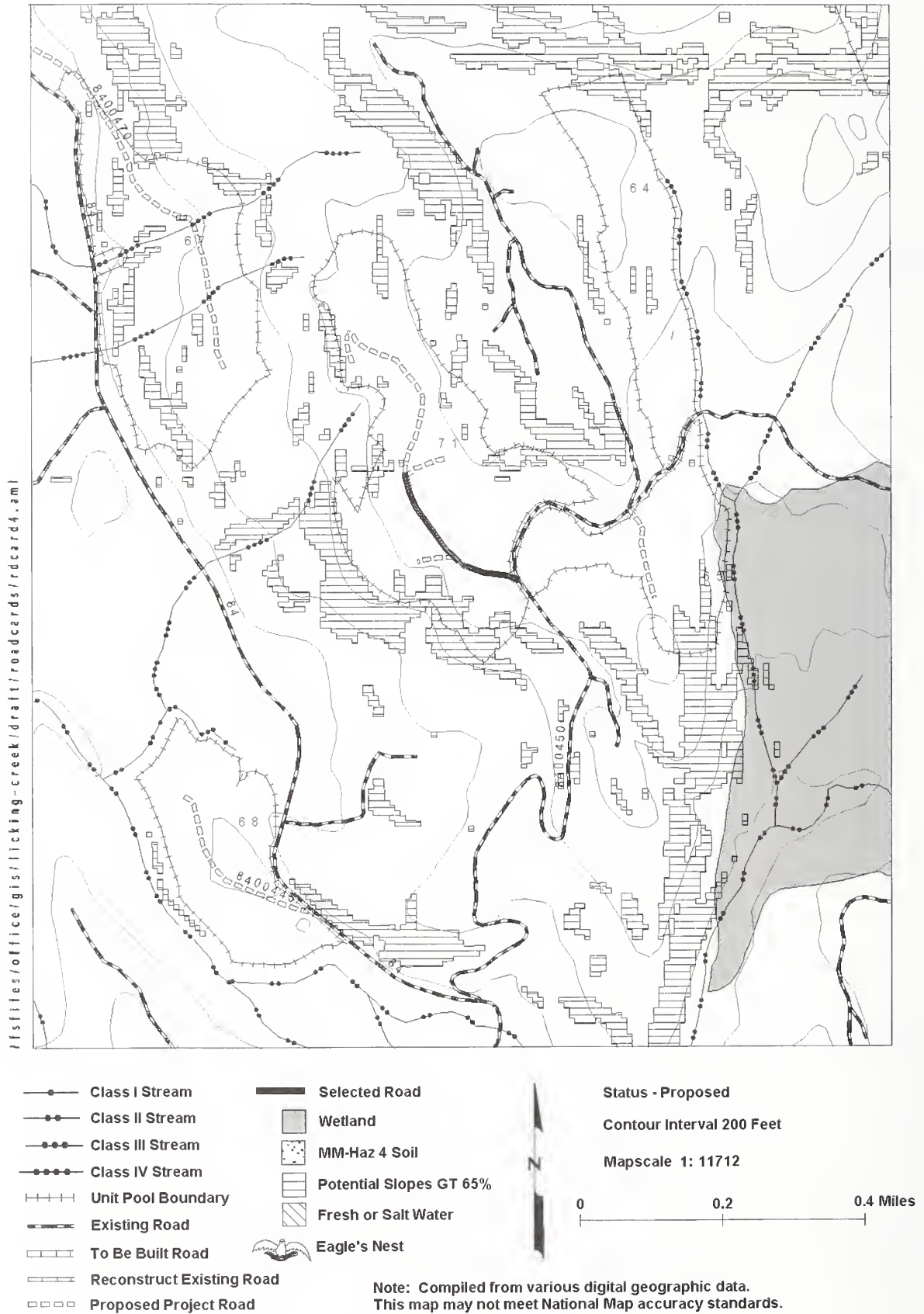
**A.) M.P. 0.879** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 4.5' Substrate: Cobble Gravel  
Gradient Upstream: 10 Gradient Downstream: 12 Structure: CP Passage required: No Timing Dates: N/A

**B.) M.P. 1.095** AHMU: Class IV Channel Type: MM Channel Bedwidth: 2.1' Substrate: Cobble Gravel  
Gradient Upstream: 1 Gradient Downstream: 1 Structure: CP Passage required: No Timing Dates: N/A

**C.) M.P. 1.457** AHMU: Class III Channel Type: HC1 Channel Bedwidth: 3.5' Substrate: Fine Gravel/Small Cobble  
Gradient Upstream: 19 Gradient Downstream: 15 Structure: CP Passage required: No Timing Dates: N/A

**D.) M.P. 1.487** AHMU: Class III Channel Type: HC1 Channel Bedwidth: 3.5' Substrate: Fine Gravel/Small Cobble  
Gradient Upstream: 15 Gradient Downstream: 18 Structure: CP Passage required: No Timing Dates: N/A

## Licking Creek Road Card Road 8400451 - Proposed



## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> TP
<b>Route No.</b> 8400451	<b>In Alternatives</b> 4	<b>Status</b> New Construction
<b>Begin Kilometer Post</b>  Road 8400451 intersects Road 8400450 at Kilometer Post 0.470	<b>Length</b> [kilometers (miles)] 0.386 km (0.24 mi)	<b>Begin Termini</b> (Kilometer Post) 0.000
		<b>End Termini</b> (Kilometer Post) 0.386

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Log truck	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_



# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8400451

**Road Location:** Road accesses Unit 71. Road was located to avoid steep cliffs near east side of unit. Road construction will be moderate to easy with little impact on terrain. Grades where road is located are under 10 percent and only at the terminus of the road are sideslopes greater than 30 percent.

**Wetlands:** No crossing of wetlands is anticipated. Should wetland areas be identified during final layout, the road will be modified to avoid or minimize effects on wetlands, and appropriate standards will be applied (BMP 12.5).

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8 are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

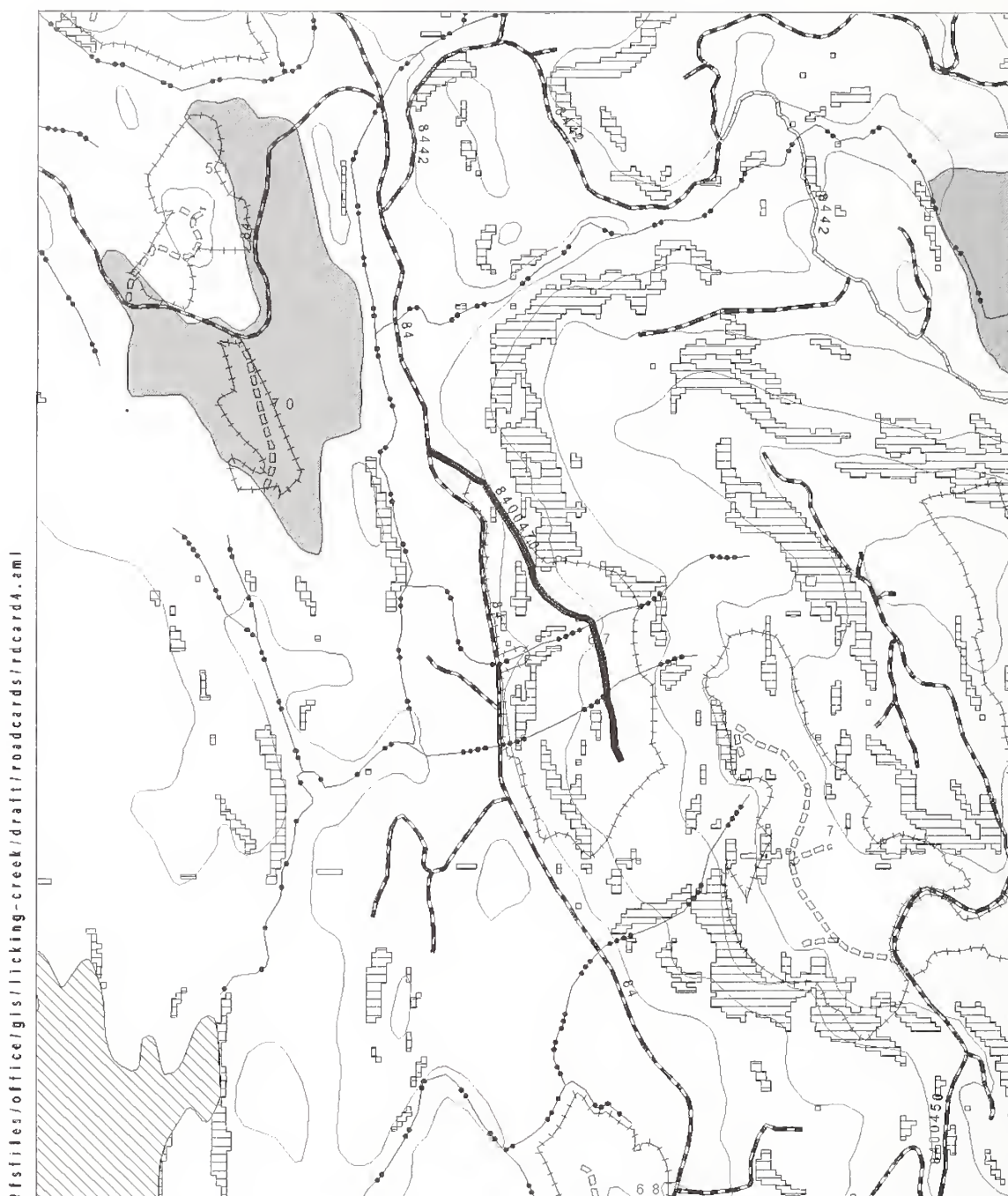
## Road Management Objectives

### Stream Crossings

#### Road No. 8400451

A.) M.P. 0.052 AHMU: Class IV Channel Type: HC1 Channel Bedwidth: 2.2' Substrate: Sand Gravel  
Gradient Upstream: 8 Gradient Downstream: 6 Structure: CP Passage required: No Timing Dates: N/A

# Licking Creek Road Card Road 8400470 - Proposed



- |                             |                           |
|-----------------------------|---------------------------|
| —●— Class I Stream          | — Selected Road           |
| —●●— Class II Stream        | ■ Wetland                 |
| —●●●— Class III Stream      | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream      | ■ Potential Slopes GT 65% |
| ++++ Unit Pool Boundary     | ■ Fresh or Salt Water     |
| — Existing Road             | ■ Eagle's Nest            |
| □ To Be Built Road          |                           |
| □ Reconstruct Existing Road |                           |
| □ Proposed Project Road     |                           |

Status - Proposed

Contour Interval 200 Feet

Mapscale 1: 14039

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.



## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> ML
<b>Route No.</b> 8400470	<b>In Alternatives</b> 4	<b>Status</b> New construction
<b>Begin Kilometer Post</b>  Road 8400470 begins at intersection with Road 8400000 at Kilometer Post 55.734	<b>Length</b> <b>[kilometers (miles)]</b> 0.933 km (0.58 mi)	<b>Begin Termini</b> <b>(Kilometer Post)</b> 0.000
		<b>End Termini</b> <b>(Kilometer Post)</b> 0.933

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Log truck	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8400470

**Road Location:** Road location begins on Road 8400000 km 55.734 and accesses Unit 67. The first 275 meters are in a cutover section of timbered lands. Road location then begins a favorable grade of 15 percent to gain elevation, and avoids the steep rock face immediately to the east and out of the unit. This continues for 1.5 km and crosses a minimal amount of wetlands. Road is located at this point to cross a drainage at its best location, above where it becomes steep and wide. Road may be either composite or spur for the remainder of the road as slopes are less than 25-30 percent. Because the road avoids steep areas and is located to avoid the rock face, construction will be moderate. If sideslopes greater than 67 percent are found, then excavation will be end hauled.

**Wetlands:** Use overlay road construction on wetlands and minimize side ditching, where practicable, to minimize the effects upon groundwater flow (BMP 14.3). Avoid the placement of fill material or the side casting of waste material in wetlands (BMP 14.19).

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMP 12.17, 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8 are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** Part of the road is visible from Carroll Inlet. Avoid side casting on downhill side of road.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

### Stream Crossings

#### Road No. 8400470

**A.) M.P. 0.248** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.3' Substrate: Cobble Gravel  
Gradient Upstream: 22 Gradient Downstream: 54 Structure: CP Passage required: No Timing Dates: N/A

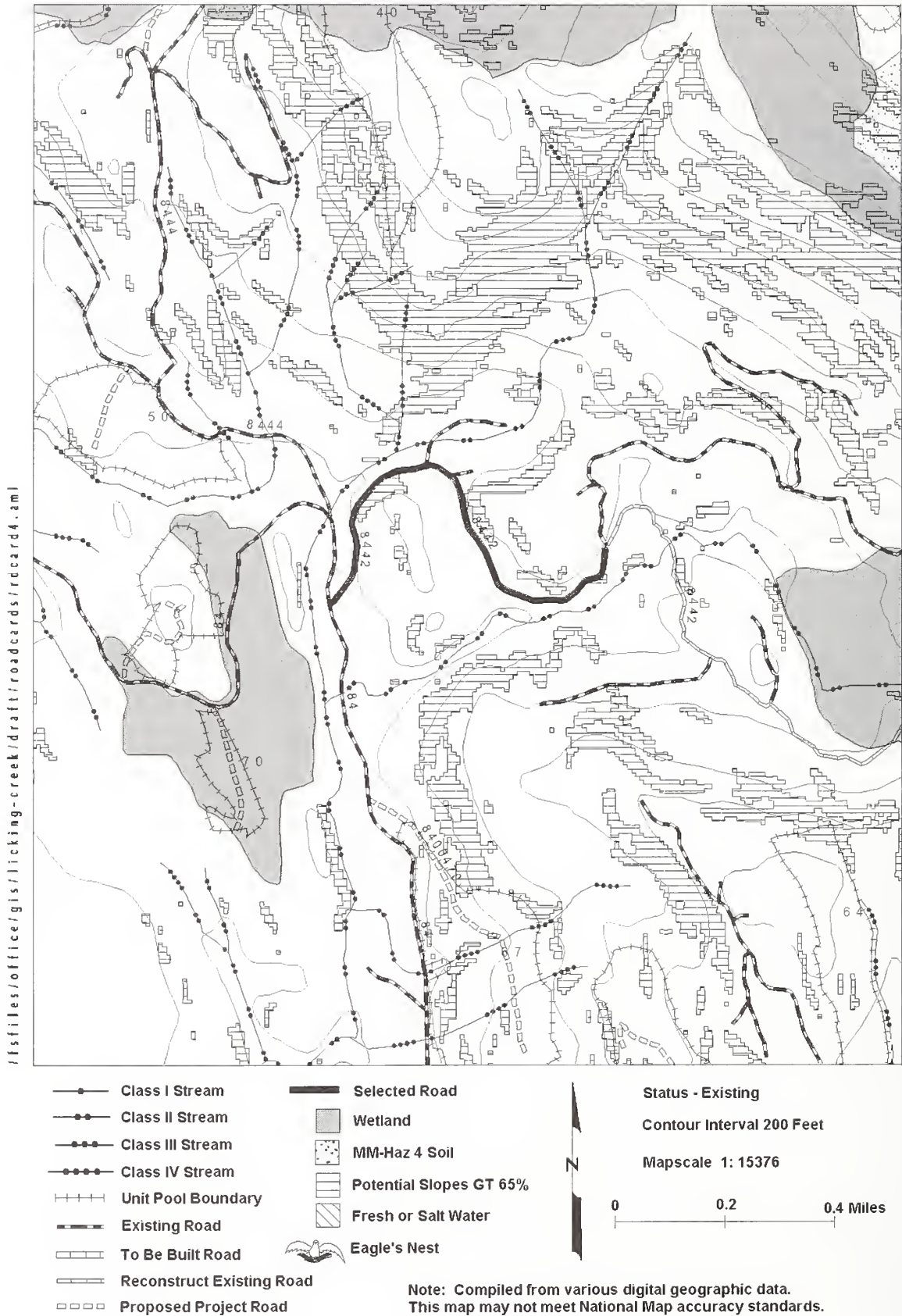
**B.) M.P. 0.366** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 4.2' Substrate: Cobble Gravel  
Gradient Upstream: 31 Gradient Downstream: 33 Structure: CP Passage required: No Timing Dates: N/A

**C.) M.P. 0.479** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.3' Substrate: Cobble Gravel  
Gradient Upstream: 22 Gradient Downstream: 54 Structure: CP Passage required: No Timing Dates: N/A

**Narrative:** Stream not shown on map; this crossing was identified in the field.



## Licking Creek Road Card Road 8442 (8442000) - Existing



## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	TP
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8442000-Existing	2, 3, 4, 5	Existing
<b>Begin Kilometer Post</b>	<b>Length</b>	<b>Begin Termini</b>
	<b>[kilometers (miles)]</b>	<b>(Kilometer Post)</b>
Road 8442000 begins at the intersection with Road 8400000 Kilometer Post 56.365	1.417 km (0.88 mi)	0.000 km
		<b>End Termini</b>
		<b>(Kilometer Post)</b>
		1.417

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
C	Long Term	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Uses include silvicultural activities and administrative use.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No      **Jurisdiction:** National Forest System      **AFRPR Status:** Open

**Travel Management Strategies:**

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Road will remain open for Forest Service administrative purposes. Road will have maintenance on a scheduled time frame to preserve the resources accessed by this road. Bridge is to remain through current 10-year action plan for timber sales unless approved for removal by District Ranger.

**District Ranger Approval (signature:)** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8442000-Existing

**Road Location:** Existing road requires a minimal amount of maintenance to achieve Road Management Objectives. Only the first 1.465 kilometers of road will need the minimal maintenance. This is followed by a section of reconstruction shown on 8442000-R road card. Beyond this reconstruction, no maintenance will occur. During pre-haul maintenance, soils/water concerns will be addressed.

**Wetlands:** Existing road section does not cross wetlands.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). Items addressed in Resource Information will be corrected during road maintenance activities. Wetlands Protection Measures (BMP 12.5) will be followed. Revegetation of Disturbed Areas (BMP 12.17) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. Road Access (BMP 14.20) and Access Management (BMP 14.22) will be implemented.

**Rock Pits:** Existing rock pits are located for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Pre-haul maintenance should address the following issue: a shallow ditch between Mileposts 0.08 and 0.538. Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following reconstruction (BMPs 12.17 and 14.8).

**Silviculture:** Keep the lower segment of this road open for at least 3 years following harvest to fulfill silvicultural needs. The upper segment of this road may be closed as it is not needed to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



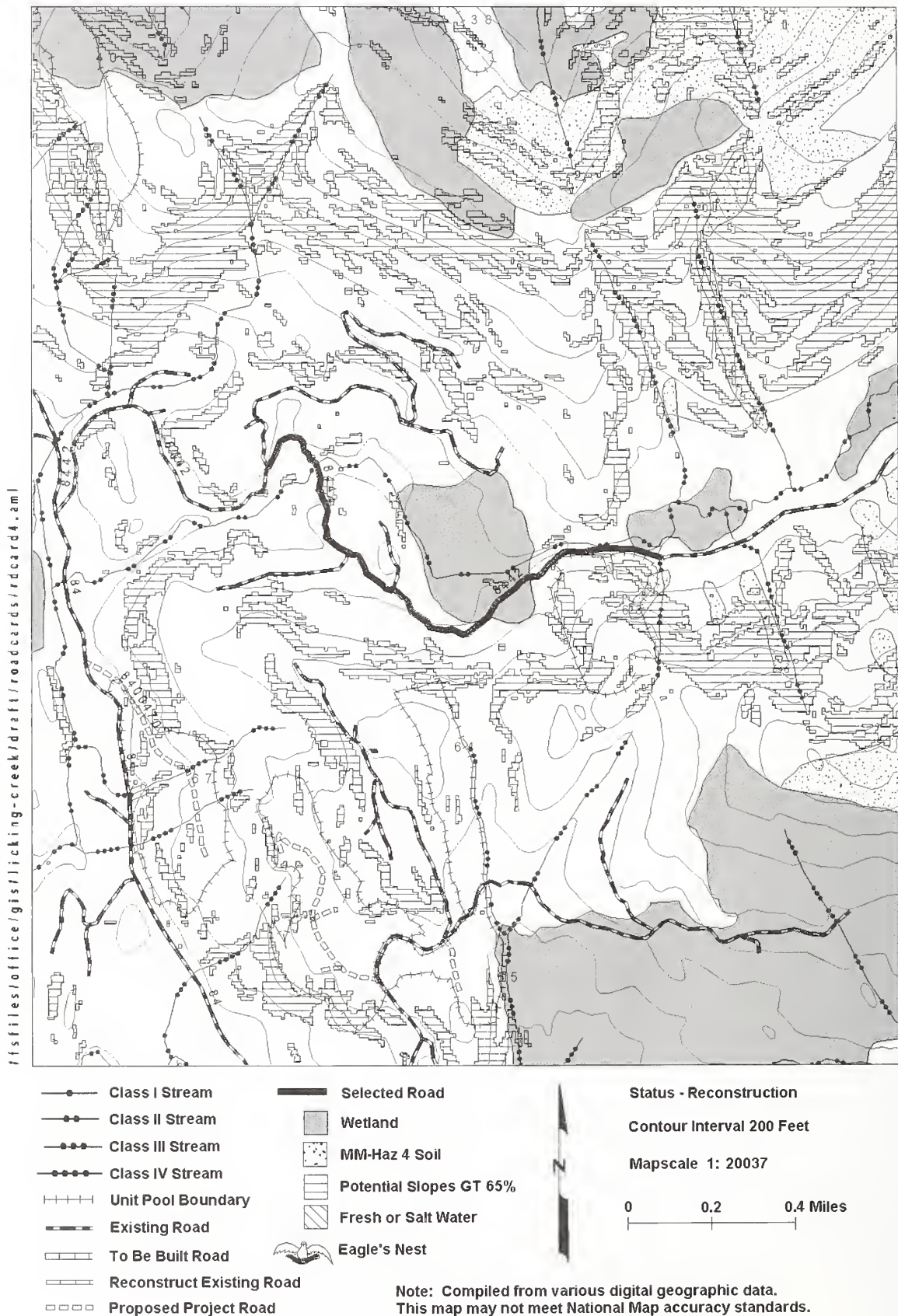
## **Road Management Objectives**

### **Stream Crossings**

#### **Road No. 8442000-E**

No designated streams are crossed on this road section.

**Licking Creek Road Card**  
**Road 8442 (8442000) - Reconstruction**



## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	TP
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8442000-Reconstruction	2, 3, 4, 5	Reconstruction
<b>Begin Kilometer Post</b>	<b>Length [kilometers (miles)]</b>	<b>Begin Termini Kilometer Post</b>
Road 8442000 begins at the intersection with Road 8400000 Kilometer Post 56.365	2.206 km (1.37 mi)	<b>End Termini Kilometer Post</b> 3.353

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
C	LI	D	Rock	4.3 m	Pickup truck	Pickup truck	25 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:** To access the units, 2.96 kilometers of road will be reconstructed, and 1.47 kilometers will have light maintenance (see existing Road 8442000 road card). At the end of silvicultural activities, road will be maintained for use by administrative vehicles.

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

### **Travel Management Strategies:**

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Reconstruction will be needed on 2.96 kilometers of road to bring road up to necessary level for silvicultural activities. Reconstruction will consist of replacing culverts and other drainage structures, reestablishing the road prism, and clearing for sight distance brush and overgrowth of trees. At termination of silvicultural activities, road will be maintained to allow administrative vehicles. Bridge will remain through current 10-year action plan for timber sales, unless approved for removal by District Ranger.

**District Ranger Approval (signature):** \_\_\_\_\_

**Date:** \_\_\_\_\_



# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8442000-R

**Road Location:** Existing road is to be reconstructed.

**Wetlands:** Road reconstruction along the small area in the middle section of Road 8442000-R that crosses wetlands and requires road reconstruction will not further impact wetlands and will not change the existing footprint.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). During road maintenance activities, Wetlands Protection Measures (BMP 12.5) will be followed. Revegetation of Disturbed Areas (BMP 12.17) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. Road Access (BMP 14.20) and Access Management (BMP 14.22) will be implemented. When required, drainage structure will be placed during the restricted timing as per Timing Restrictions for Construction Activities/Fisheries Prescriptions (BMP 14.6).

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Avoid the placement of fill material or the side casting of waste material into wetlands or on steep, potentially unstable slopes (BMPs 14.7 and 14.9). Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Keep road open to ensure access to units until they are certified as stocked as required by NFMA.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

### Stream Crossings

#### Road No. 8442000-R

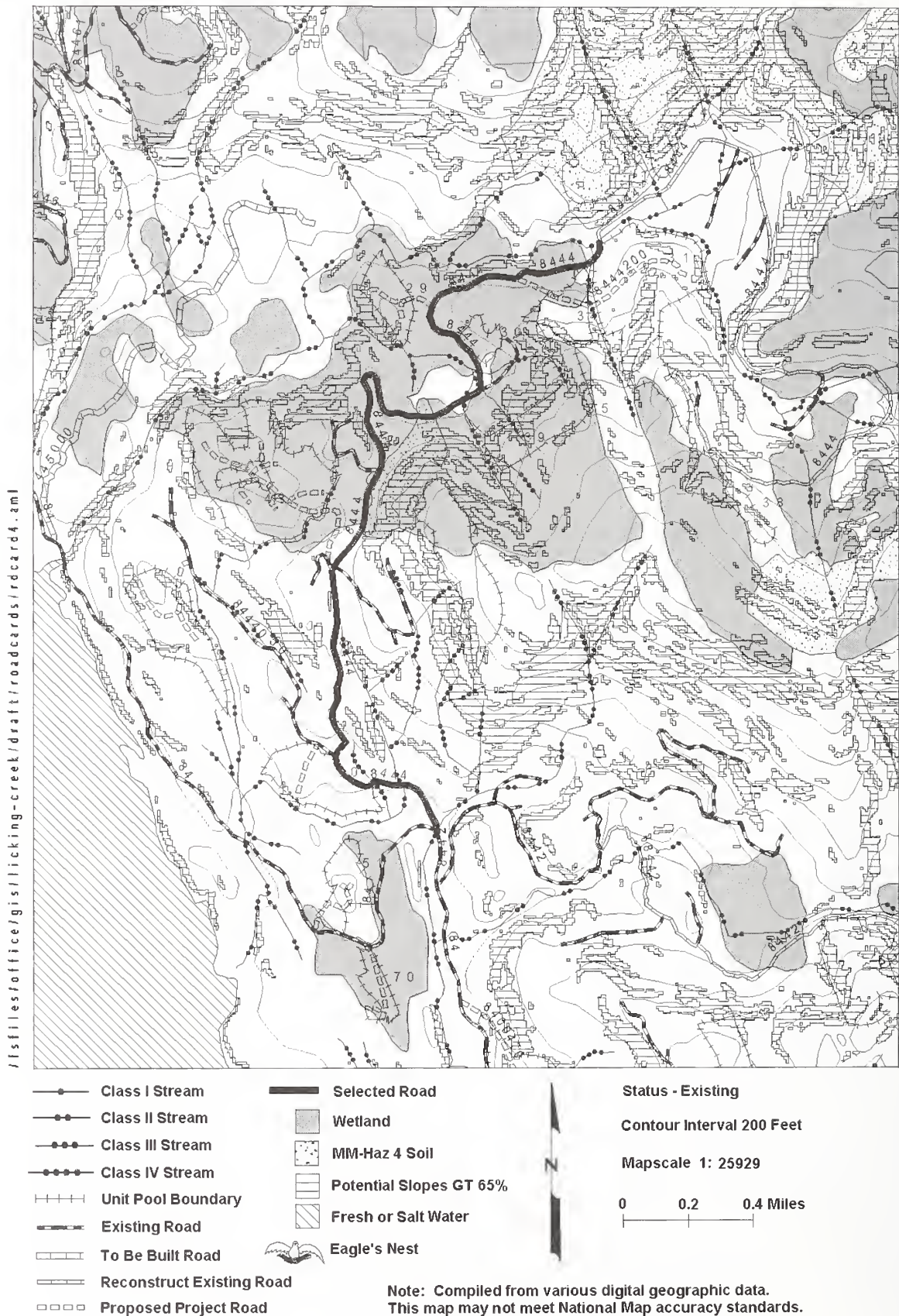
**A.) M.P. 1.009** AHMU: Class III Channel Type: MC1 Channel Bedwidth: 10.2' Substrate: Cobble Gravel  
Gradient Upstream: 16 Gradient Downstream: 8 Structure: removed bridge Passage required: Yes Timing Dates:  
N/A

**B.) M.P. 1.106** AHMU: Class II Channel Type: LC1 Channel Bedwidth: 22.0' Substrate: Cobble Gravel  
Gradient Upstream: 16 Gradient Downstream: 8 Structure: removed bridge Passage required: No Timing Dates: N/A

**C.) M.P. 1.727** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.5' Substrate: Cobble Gravel  
Gradient Upstream: 46 Gradient Downstream: 36 Structure: removed culvert Passage required: No Timing Dates:  
N/A

**D.) M.P. 1.988** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 3.1' Substrate: Bedrock Cobble  
Gradient Upstream: 26 Gradient Downstream: 13 Structure: removed culvert Passage required: No Timing Dates:  
N/A

## Licking Creek Road Card Road 8444 (8444000) - Existing





## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	TP
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8444000-Existing	2, 3, 4, 5	Existing
<b>Begin Kilometer Post</b>	<b>Length [kilometers (miles)]</b>	<b>Begin Termini (Kilometer Post)</b>
Road 8444000 begins at the intersection of Road 8400000 Kilometer Post 56.627.	5.055 km (3.14 mi)	<b>End Termini (Kilometer Post)</b> 5.055

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
C	Long Term	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Uses include silvicultural activities and administrative activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:** This is an existing road, presently drivable. Light maintenance will be required—brushing, blading, and ditch cleanup for use on the project.

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

#### **Travel Management Strategies:**

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Road will remain open for Forest Service administrative purposes. Road will have maintenance on a scheduled time frame to preserve the resources accessed by this road. Bridge will remain through current 10-year action plan for timber sales, unless approved for removal by District Ranger.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444000-Existing

**Road Location:** Existing road requires minimal maintenance to achieve road management objectives. During pre-haul maintenance, soils/water concerns will be addressed.

**Wetlands:** Road management along the portion of Road 8444000-E that crosses wetlands and requires road maintenance will not further impact wetlands and will not change the existing footprint.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). During road maintenance activities, Wetlands Protection Measures (BMP 12.5) will be followed. Revegetation of Disturbed Areas (BMP 12.17) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. Road Access (BMP 14.20) and Access Management (BMP 14.22) will be implemented.

**Rock Pits:** Existing rock pits are located for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Pre-haul maintenance will correct the following: blowdown in ditch at Mileposts 0.24, 0.45, 1.15, and 2.76, boulders/rocks in ditch at Mileposts 0.48 and 2.86, rocks in pipe at Milepost 2.91, and cut slope in ditch repeatedly between Mileposts 0.59 and 1, also between Mileposts 2.5 and 2.7. At Milepost 0.5, the ditch needs some reconstruction. At Milepost 1.99, water is on the road from a missing structure. At Milepost 1.37, there is standing water in the ditch—needs pipe.

**Silviculture:** Keep road open following harvest to ensure access to units until they are certified as stocked, as required by NFMA, and to keep other potential silvicultural activities, such as thinning, viable.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

### Stream Crossings

#### Road No. 8444000-Existing

**A.) M.P. 0.161** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 2.3' Substrate: Boulder Cobble  
Gradient Upstream: 8 Gradient Downstream: 7 Structure: CP Passage required: Yes Timing Dates: N/A

**B.) M.P. 0.205** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 5.1' Substrate: Cobble Gravel  
Gradient Upstream: 9 Gradient Downstream: 13 Structure: CP Passage required: No Timing Dates: N/A

**C.) M.P. 1.894** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.8' Substrate: Boulder Bedrock  
Gradient Upstream: 36 Gradient Downstream: 18 Structure: CP Passage required: No Timing Dates: N/A

**D.) M.P. 2.079** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.3' Substrate: Bedrock Boulder  
Gradient Upstream: 43 Gradient Downstream: 17 Structure: CP Passage required: No Timing Dates: N/A

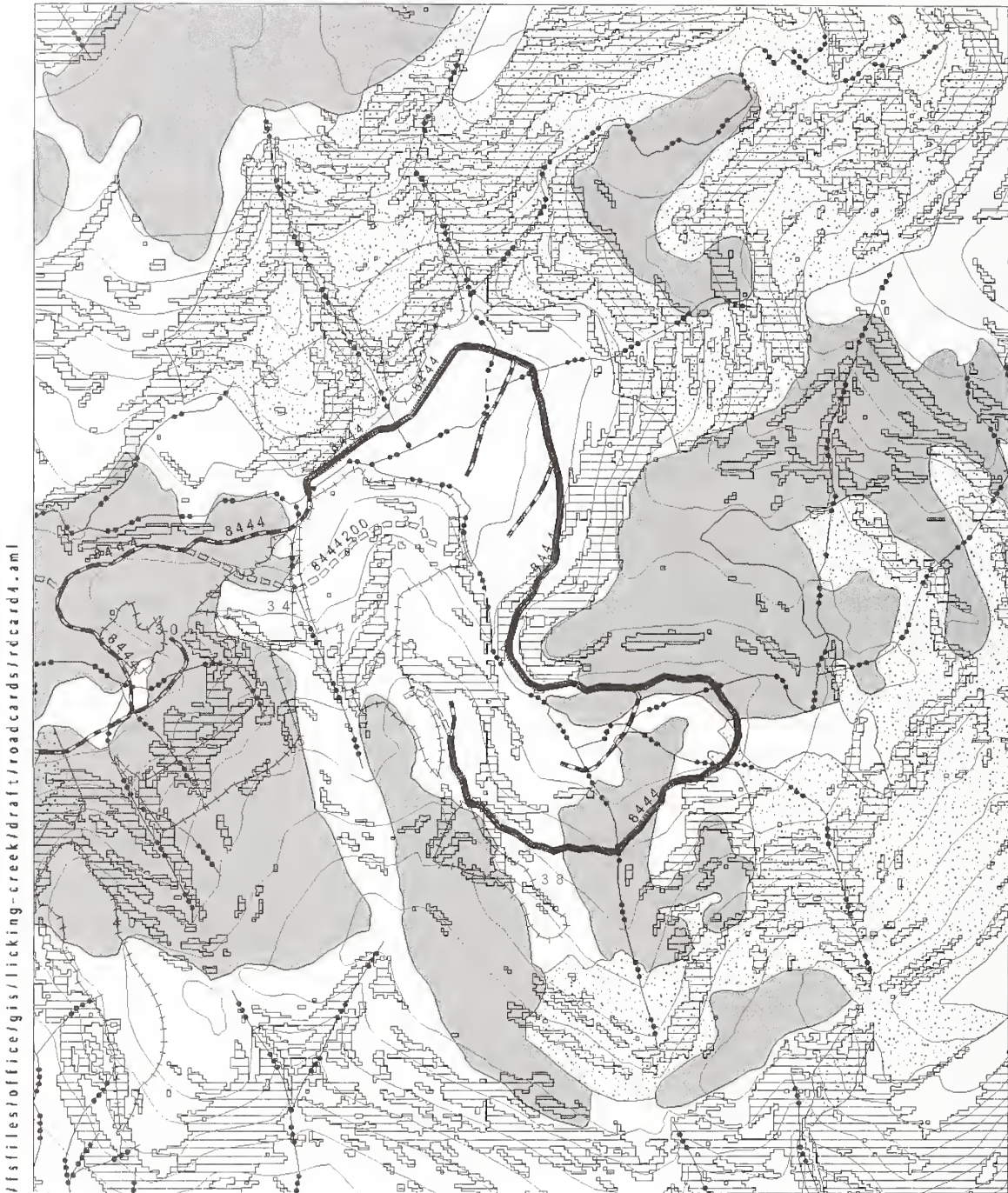
**E.) M.P. 2.145** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 6.5' Substrate: Boulder Cobble  
Gradient Upstream: 13 Gradient Downstream: 17 Structure: CP Passage required: No Timing Dates: N/A

**F.) M.P. 2.257** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 2.3' Substrate: Boulder Cobble  
Gradient Upstream: 6 Gradient Downstream: 6 Structure: CP Passage required: No Timing Dates: N/A

**G.) M.P. 3.074** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 7.5' Substrate: Bedrock Boulder  
Gradient Upstream: 19 Gradient Downstream: 18 Structure: CP Passage required: No Timing Dates: N/A



## Licking Creek Road Card Road 8444 (8444000) - Reconstruction



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- |                             |                           |
|-----------------------------|---------------------------|
| —●— Class I Stream          | — Selected Road           |
| —●●— Class II Stream        | ■ Wetland                 |
| —●●●— Class III Stream      | □ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream      | □ Potential Slopes GT 65% |
| ++++ Unit Pool Boundary     | □ Fresh or Salt Water     |
| — Existing Road             | — Eagle's Nest            |
| □ To Be Built Road          |                           |
| □ Reconstruct Existing Road |                           |
| □ Proposed Project Road     |                           |



Status - Reconstruction  
Contour Interval 200 Feet  
Mapscale 1: 19811  
0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	TP
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8444000-Reconstruction	2, 3, 4, 5	Reconstruction
<b>Begin Kilometer Post</b>	<b>Length [kilometers (miles)]</b>	<b>Begin Termini (Kilometer Post)</b>
Reconstruction begins at the end the existing road portion requiring only maintenance at Kilometer Post 5.055	Alts 2,3,5: 4.411 km (2.74 mi)	5.055
	Alt 4: 0.477 km (0.29 mi)	5.055
		<b>End Termini (Kilometer Post)</b>
		9.466
		5.522

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
C	LI	D	Rock	4.3 m	Log truck	Pickup truck	25 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:** Road requires 4.44 kilometers of reconstruction to enable the road to be placed in status for silvicultural activities. This will require the replacement of culverts and other drainage structures, the reestablishment of the road prism and brushing to allow sight distance. The beginning 5.59 kilometers (see road card for existing Road 8444000) of road will have light maintenance done to facilitate silvicultural activities. This will consist of light brushing and blading to achieve the road prism.

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

### **Travel Management Strategies:**

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Road will have light maintenance done over a portion of the road and heavy reconstruction done to the remainder of the road to prevent resource damage and protect natural resources. At the termination of silvicultural activities, the road will be maintained for administrative vehicles. Road will have maintenance on a scheduled time frame to preserve the resources accessed by this road. Bridge will remain through current 10-year action plan for timber sales, unless approved for removal by District Ranger.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444000-R

**Road Location:** There are 4.273 kilometers (2.9 miles) of this road currently closed, having been placed in storage. The road location will remain within the footprint of its present location. The road will require extensive reconstruction. This reconstruction will consist of placing drainage structures in all AHMU classes of streams. Those streams which require timing will have drainage structures placed between June 7 and August 15. Sufficient cross drains will be placed to prevent erosion or sediments entering streams. Ditchlines will be excavated, additional borrow excavation placed, and any needed brushing done to reestablish the road prism.

**Wetlands:** Although extensive road reconstruction within wetlands is required along southern portions of 8444000-R, no additional wetlands will be impacted (BMP 12.5).

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is road reconstruction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during reconstruction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed. When required, drainage structure will be placed during the restricted timing as per Timing Restrictions for Construction Activities/Fisheries Prescriptions (BMP 14.6).

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following reconstruction (BMPs 12.17 and 14.8).

**Silviculture:** Keep road open following harvest to ensure access to units until they are certified as stocked, as required by NFMA, and to keep other potential silvicultural activities, such as thinning, viable.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



## Road Management Objectives

### Stream Crossings

#### Road No. 8444000-R

**A.) M.P. 3.151** AHMU: Class II Channel Type: MM2 Channel Bedwidth: 42.6' Substrate: Boulder Cobble  
Gradient Upstream: 4 Gradient Downstream: 3 Structure: Removed Bridge Passage required: Yes Timing  
Dates: 7 June – 14 August.

**B.) M.P. 3.366** AHMU: Class IV Channel Type: HC2 Channel Bedwidth: 1.8' Substrate: Cobble, Gravel  
Gradient Upstream: 20 Gradient Downstream: 15 Structure: CP Passage required: No Timing Dates: N/A

**C.) M.P. 3.451** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 6.5' Substrate: Cobble Gravel  
Gradient Upstream: 14 Gradient Downstream: 17 Structure: CP Passage required: No Timing Dates: N/A

**D.) M.P. 3.638** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 27.3' Substrate: Boulder Cobble  
Gradient Upstream: 16 Gradient Downstream: 8 Structure: CP Passage required: Yes Timing Dates: 7 June –  
14 August.

**Narrative:** Timing required due to influence to downstream fish habitat.

**E.) M.P. 3.730** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 2.3' Substrate: Cobble, Gravel  
Gradient Upstream: 18 Gradient Downstream: 6 Structure: CP Passage required: No Timing Dates: N/A

**F.) M.P. 3.794** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 6.3' Substrate: Cobble Gravel  
Gradient Upstream: 24 Gradient Downstream: 26 Structure: CP Passage required: No Timing Dates: N/A

**G.) M.P. 4.812** AHMU: Class IV Channel Type: HC2 Channel Bedwidth: 2.4' Substrate: Gravel, Sand  
Gradient Upstream: 19 Gradient Downstream: 17 Structure: Removed Bridge Passage required: Yes Timing Dates:  
N/A.

**H.) M.P. 4.921** AHMU: Class 2 Channel Type: HC2 Channel Bedwidth: 16.8' Substrate: Boulder, Cobble  
Gradient Upstream: 9 Gradient Downstream: 6 Structure: CP Passage required: Yes Timing Dates: N/A

**I.) M.P. 5.002** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 3.6' Substrate: Cobble Gravel  
Gradient Upstream: 49 Gradient Downstream: 13 Structure: CP Passage required: Yes Timing Dates: N/A

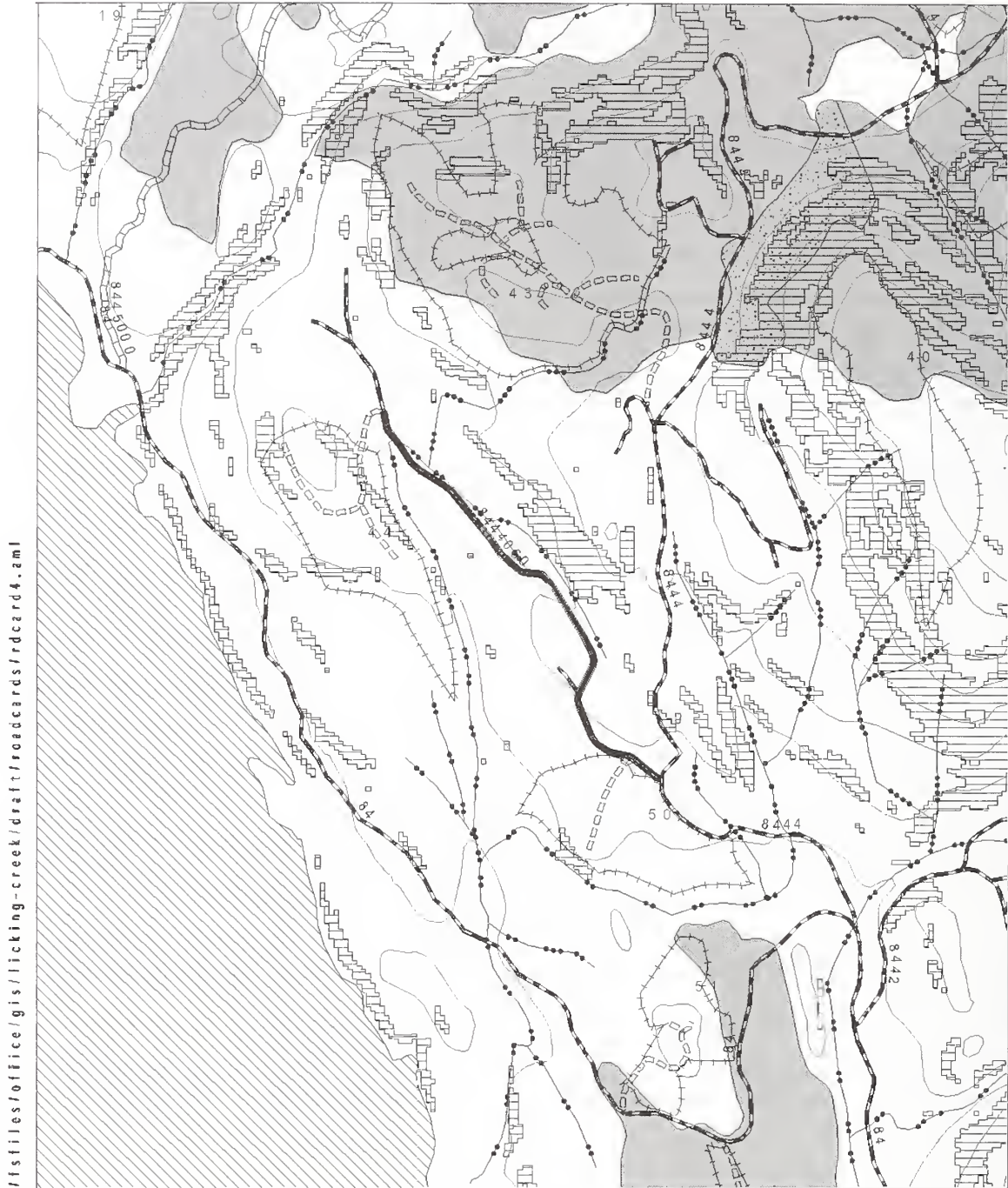
**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**J.) M.P. 5.089** AHMU: Class II Channel Type: HC2 Channel Bedwidth: 6.2' Substrate: Boulder Cobble  
Gradient Upstream: 38 Gradient Downstream: 16 Structure: CP Passage required: Yes Timing Dates: 7 June – 14  
August.

**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**K.) M.P. 5.414** AHMU: Class III Channel Type: HC2 Channel Bedwidth: 8.6' Substrate: Cobble, Gravel  
Gradient Upstream: 18 Gradient Downstream: 29 Structure: CP Passage required: No Timing Dates: N/A

Licking Creek Road Card  
Road 8444050 – Existing



- |                               |                           |
|-------------------------------|---------------------------|
| —●— Class I Stream            | — Selected Road           |
| —●●— Class II Stream          | ■ Wetland                 |
| —●●●— Class III Stream        | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream        | ■ Potential Slopes GT 65% |
| —+—+— Unit Pool Boundary      | ■ Fresh or Salt Water     |
| —+— Existing Road             | — Eagle's Nest            |
| —+— To Be Built Road          |                           |
| —+— Reconstruct Existing Road |                           |
| —+— Proposed Project Road     |                           |



Status - Existing

Contour Interval 200 Feet

Mapscale 1: 15183

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> TP
<b>Route No.</b> 8444050	<b>In Alternatives</b> 4	<b>Status</b> Existing
<b>Begin Kilometer Post</b>  Road begins at intersection with Road 8444000 at Kilometer Post 0.471	<b>Length</b> <b>[kilometers (miles)]</b> 1.304 km (0.81 mi)	<b>Begin Termini</b> <b>(Kilometer Post)</b> 0.000
		<b>End Termini</b> <b>(Kilometer Post)</b> 1.304

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_



# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444050

**Road Location:** This is existing road--prior to use on this project, road will require brushing, replacement of drainage structures, and reestablishment of road prism.

**Wetlands:** Existing road does not cross wetlands.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is road reconstruction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during reconstruction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Existing rock pits are located for the most economical haul and the least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Avoid the placement of fill material or the side casting of waste material into wetlands or on steep, potentially unstable slopes (BMPs 14.7 and 14.9). Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

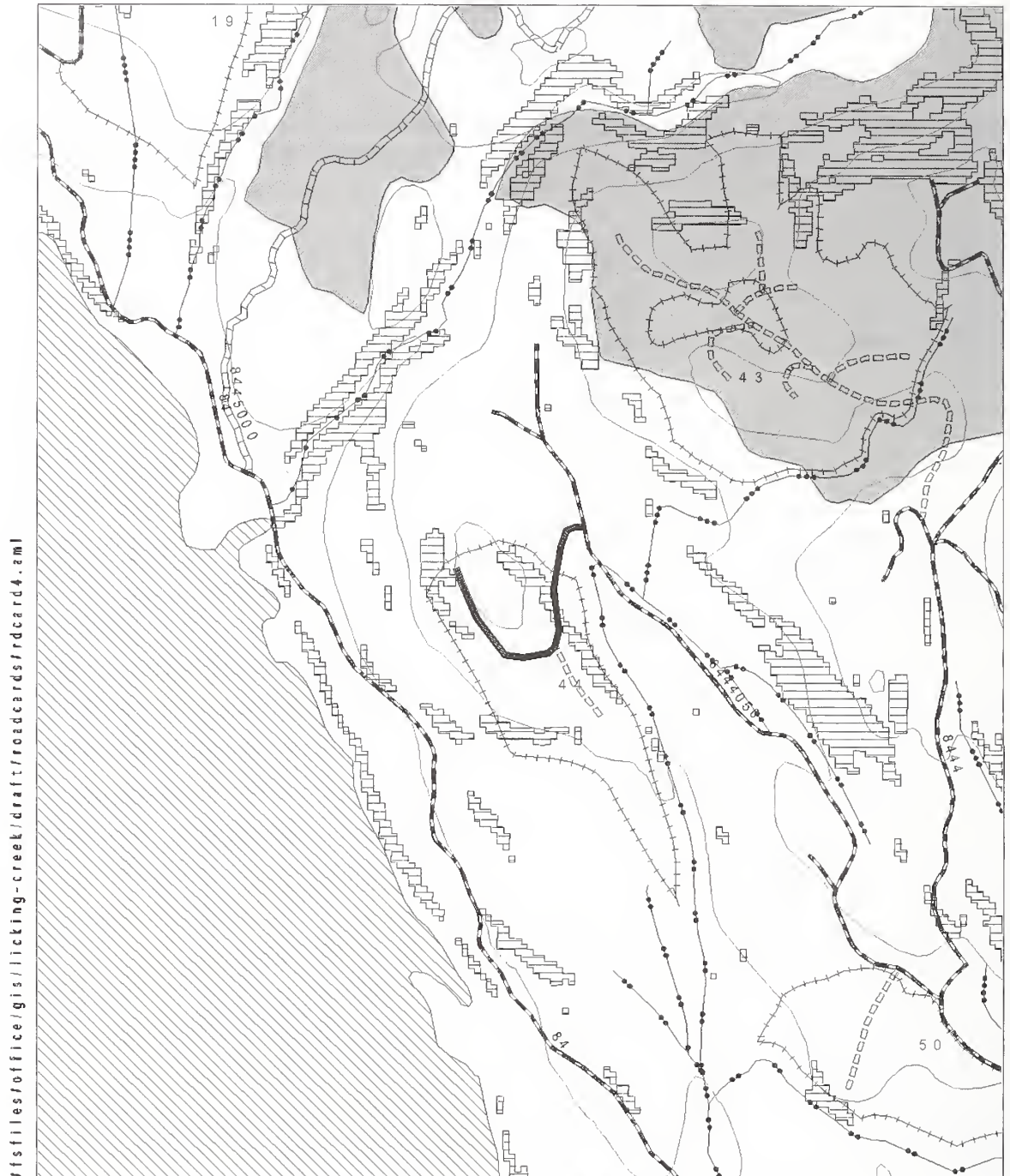
### Stream Crossings

#### Road No. 8444050

A.) **M.P. 0.749** AHMU: Class III Channel Type: MM1 Channel Bedwidth: 6.5' Substrate: Bedrock Boulder  
Gradient Upstream: 7 Gradient Downstream: 1 Structure: CP Passage required: No Timing Dates: N/A

**Narrative:** Existing culvert appears to be undersized.

## Licking Creek Road Card Road 8444051 - Proposed



- |                               |                           |
|-------------------------------|---------------------------|
| —●— Class I Stream            | — Selected Road           |
| —●●— Class II Stream          | ■ Wetland                 |
| —●●●— Class III Stream        | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream        | ■ Potential Slopes GT 65% |
| —+—+— Unit Pool Boundary      | ■ Fresh or Salt Water     |
| —+— Existing Road             | — Eagle's Nest            |
| —+— To Be Built Road          |                           |
| —+— Reconstruct Existing Road |                           |
| —+— Proposed Project Road     |                           |

Status - Proposed

Contour Interval 200 Feet

Mapscale 1: 11727

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.



## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> ML
<b>Route No.</b> 8444051	<b>In Alternatives</b> 4	<b>Status</b> New Construction
<b>Begin Kilometer Post</b>  0.000 Road 8444051 begins at Kilometer Post 1.215	<b>Length</b> [kilometers (miles)] 0.596 km (0.37 mi)	<b>Begin Termini</b> (Kilometer Post) 0.000
		<b>End Termini</b> (Kilometer Post) 0.596

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Log truck	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444051

**Road Location:** Road accesses Unit 44. It begins at the terminus of Road 8444050, an existing road. The beginning of the road is through the existing harvested unit. The road is located to accommodate logging systems and still have the least impact on other resources. Road construction is moderate to easy. If steep sideslopes greater than 67 percent are found, then excavation will be end hauled. The road follows a contour around a knob and ends at the landing from which the remaining timber can be harvested.

**Wetlands:** No crossing of wetlands is anticipated. Should wetland areas be identified during final layout, the road will be modified to avoid or minimize effects on wetlands, and appropriate standards will be applied.

**Erosion Control:** An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Avoid the placement of fill material or the side casting of waste material into wetlands or on steep, potentially unstable slopes (BMPs 14.7 and 14.9). Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** Where end of road faces Carroll Inlet in Unit 44, avoid side casting of rock on downhill slopes.

**Heritage Resources:** No resource concerns were identified.

## **Road Management Objectives**

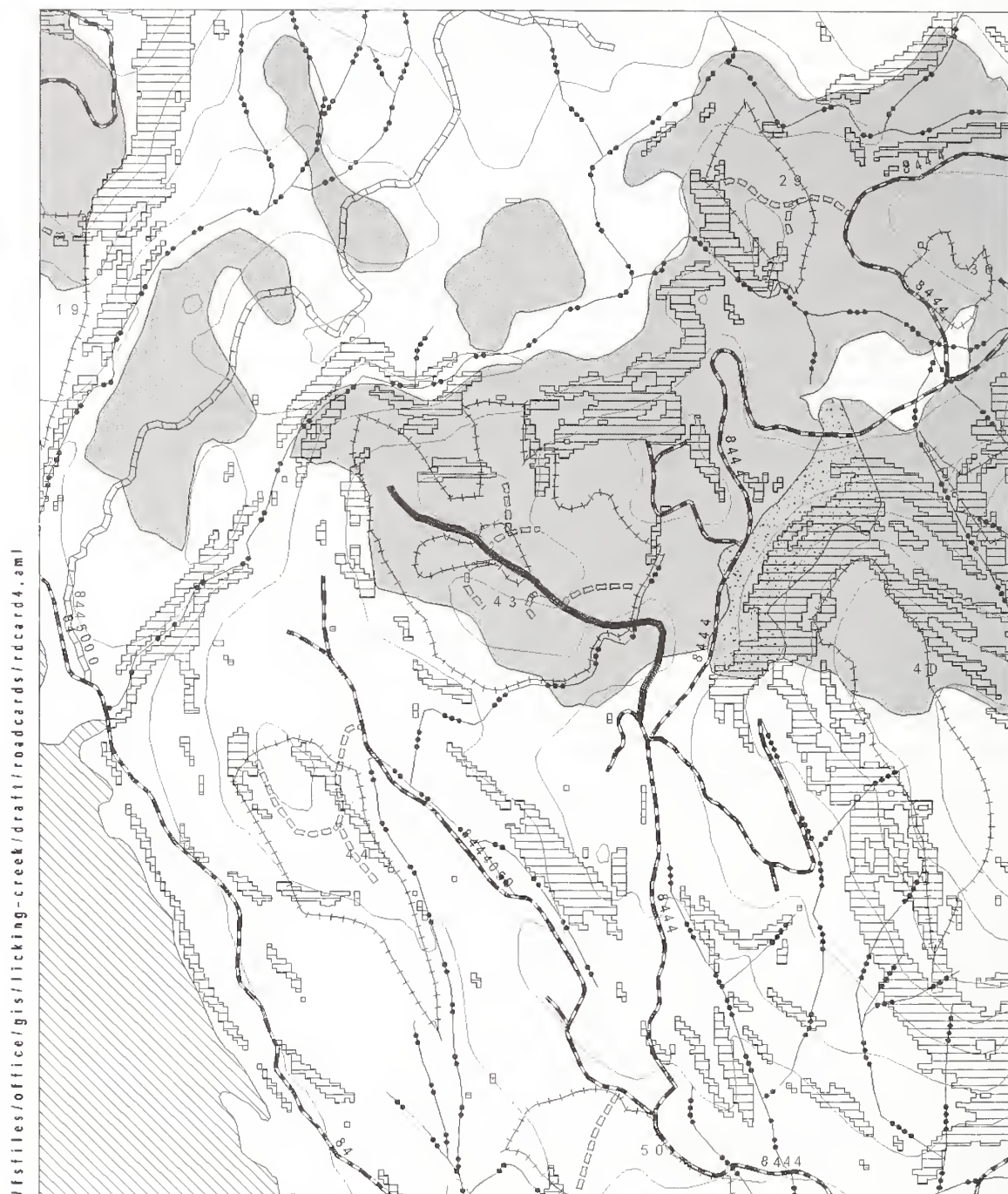
### **Stream Crossings**

#### **Road No. 8444051**

No streams are crossed on this location.



## Licking Creek Road Card Road 8444060 - Proposed



- |                               |                           |
|-------------------------------|---------------------------|
| —●— Class I Stream            | — Selected Road           |
| —●●— Class II Stream          | ■ Wetland                 |
| —●●●— Class III Stream        | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream        | ■ Potential Slopes GT 65% |
| —+—+— Unit Pool Boundary      | ■ Fresh or Salt Water     |
| —+— Existing Road             | — Eagle's Nest            |
| —+— To Be Built Road          |                           |
| —+— Reconstruct Existing Road |                           |
| —+— Proposed Project Road     |                           |

Status - Proposed

Contour Interval 200 Feet

Mapscale 1: 14446

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> ML		
<b>Route No.</b> 8444060	<b>In Alternatives</b> 4	<b>Status</b> New Construction		
<b>Begin Kilometer Post</b>  Road 8444060 begins at the intersection with Road 8444000 Kilometer Post 1.070.	<b>Length [kilometers (miles)]</b> 1.095 km (0.68 mi)	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"><b>Begin Termini (Kilometer Post)</b> 0.000</td> <td style="width: 50%;"><b>End Termini (Kilometer Post)</b> 1.095 km</td> </tr> </table>	<b>Begin Termini (Kilometer Post)</b> 0.000	<b>End Termini (Kilometer Post)</b> 1.095 km
<b>Begin Termini (Kilometer Post)</b> 0.000	<b>End Termini (Kilometer Post)</b> 1.095 km			

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Log truck	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444060

**Road Location:** Road accesses Unit 43 and begins in previously harvested area at the end of a previously constructed spur. Road construction is moderate to easy and is located to facilitate harvesting and logging operations. There are no sections of road that cross slopes greater than 67 percent. Road crosses muskeg wetland in the center of Unit 43.

**Wetlands:** Use overlay road construction on wetlands and minimize side ditching, where practicable, to minimize the effects upon groundwater flow (BMP 14.3). Avoid the placement of fill material or the side casting of waste material in wetlands (BMP 14.19).

**Erosion Control:** An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Avoid the placement of fill material or the side casting of waste material into wetlands or on steep, potentially unstable slopes (BMPs 14.7 and 14.9). Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



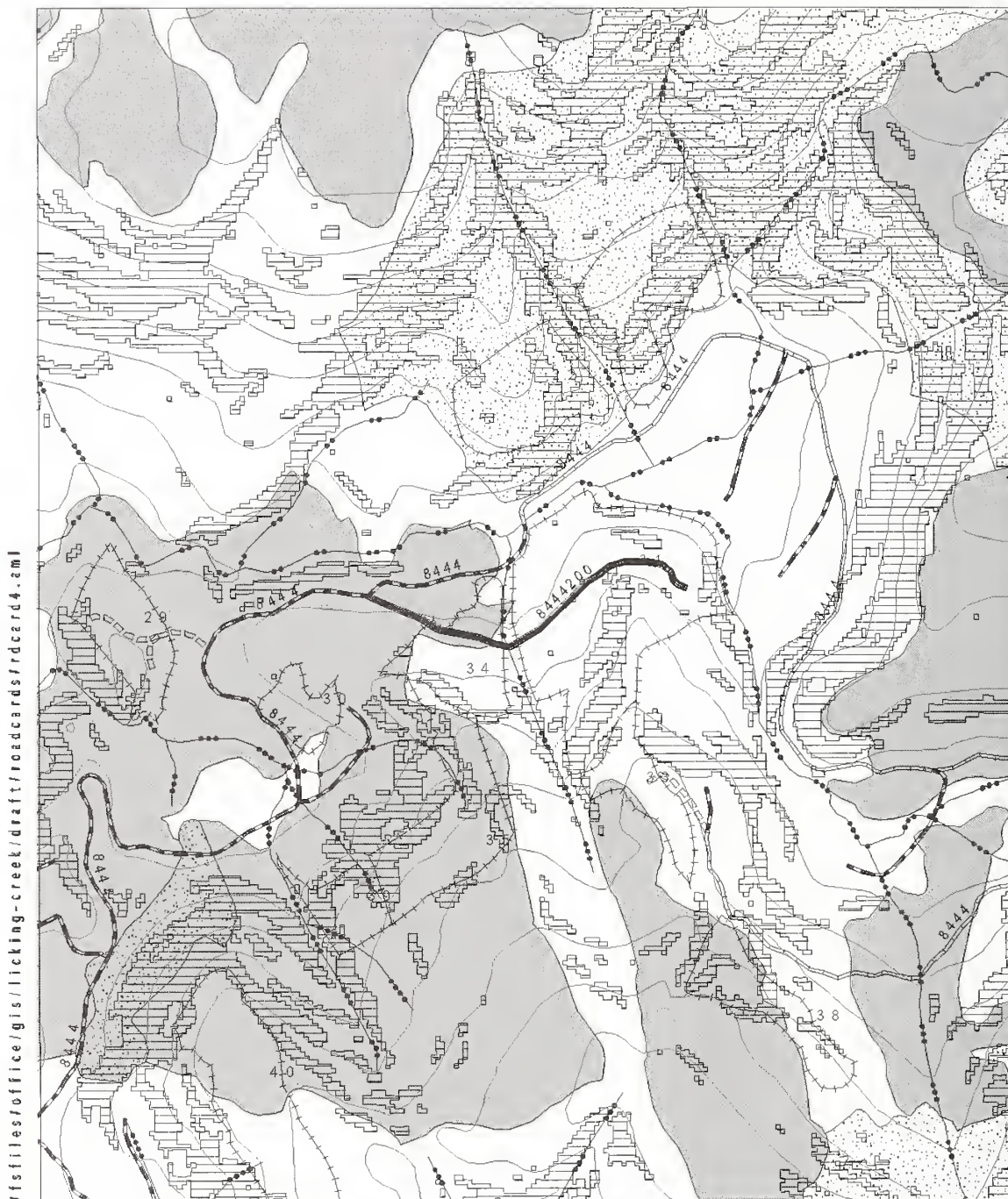
## Road Management Objectives

### Stream Crossings

#### Road No. 8444060

A.) **M.P. 0.188** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 5.1' Substrate: Bedrock Boulder  
Gradient Upstream: 16 Gradient Downstream: 18 Structure: CP Passage required: No Timing Dates: N/A

# Licking Creek Road Card Road 844200 - Proposed



- |                             |                           |
|-----------------------------|---------------------------|
| —●— Class I Stream          | — Selected Road           |
| —●●— Class II Stream        | ■ Wetland                 |
| —●●●— Class III Stream      | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream      | ■ Potential Slopes GT 65% |
| ++++ Unit Pool Boundary     | ■ Fresh or Salt Water     |
| — Existing Road             | — Eagle's Nest            |
| — To Be Built Road          |                           |
| — Reconstruct Existing Road |                           |
| — Proposed Project Road     |                           |

Status - Proposed

Contour Interval 200 Feet

Mapscale 1: 15598

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	ML
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8444200	2, 3, 4	New Construction
<b>Begin Kilometer Post</b>	<b>Length</b>	<b>Begin Termini</b>
	<b>[kilometers (miles)]</b>	<b>(Kilometer Post)</b>
Road 8444200 begins at an intersection with Road 8444000	Alt 2: 0.354 km (0.22 mi)	0.000
Kilometer Post 5.128.	Alts 3&4: 0.982 km (0.61 mi)	0.000
		<b>End Termini</b>
		<b>(Kilometer Post)</b>
		0.354 (Alt 2)
		0.982 (Alts 3&4)

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_

**Date:** \_\_\_\_\_



# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444200

**Road Location:** Road accesses Units 34 and 31. The road leaves the existing road such that it can cross the drainage at a favorable location and then climbs at 15 percent to reach a control point. Road continues around the contour to reach a landing required for timber harvest. Road stays below steep sections to limit the need to excavate for the road prism. Some end haul of excavated materials may be needed in Unit 31 near terminus of the road as slopes approach 65 percent.

**Wetlands:** The western one third of this road will cross wetlands. Use overlay road construction on wetlands and minimize side ditching, where practicable, to minimize the effects upon groundwater flow (BMP 14.3). Avoid the placement of fill material or the side casting of waste material in wetlands (BMP 14.19).

**Erosion Control:** An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Avoid the placement of fill material or the side casting of waste material into wetlands or on steep, potentially unstable slopes (BMPs 14.7 and 14.9). Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

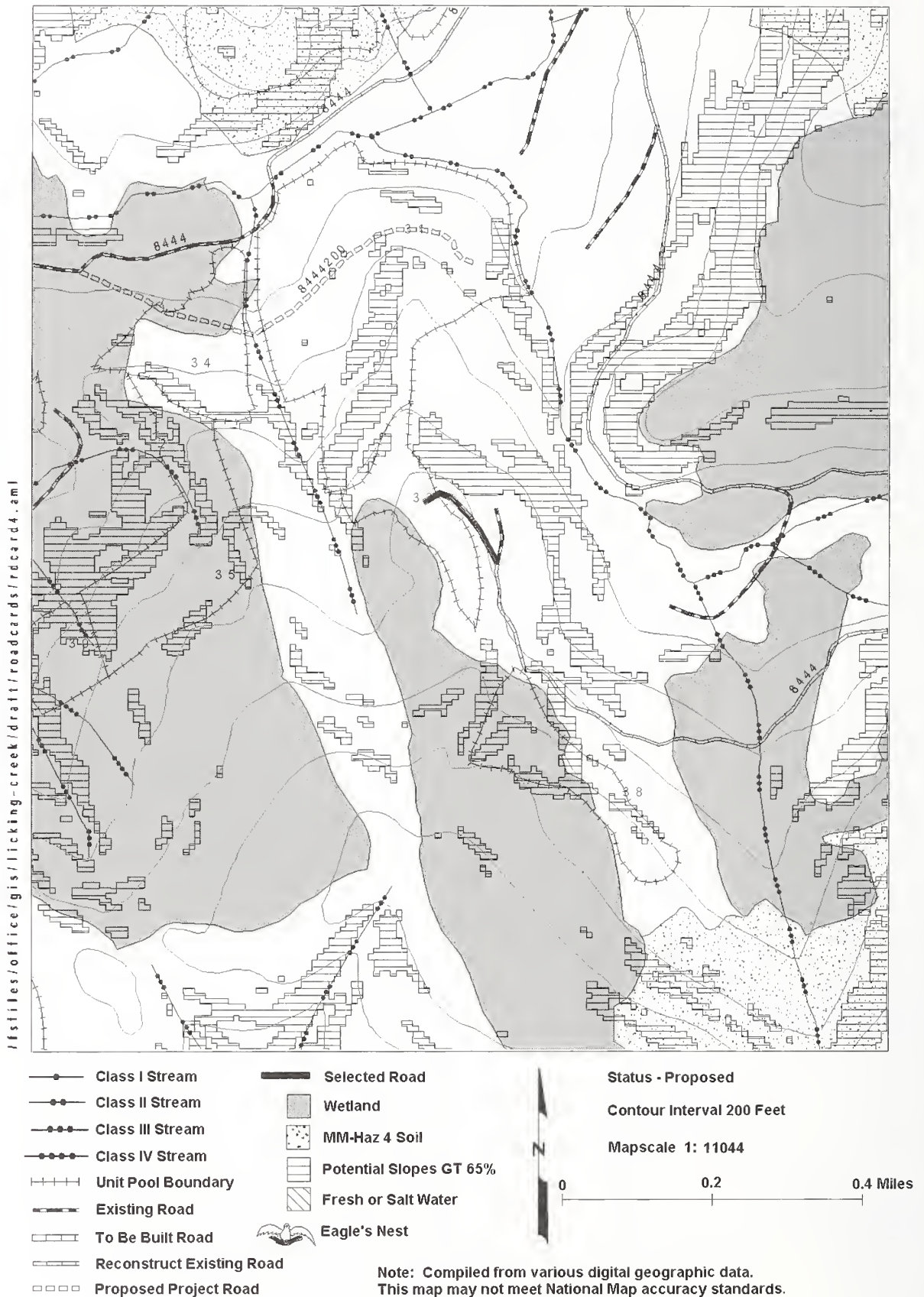
### Stream Crossings

#### Road No. 8444200

**A.) M.P. 0.245** AHMU: Class III Channel Type: HC6 Channel Bedwidth: 7.2' Substrate: Bedrock Boulder  
Gradient Upstream: 18 Gradient Downstream: 15 Structure: CP Passage required: No Timing Dates: N/A

**Narrative:** The stream crossing is located immediately above fish habitat and may require more than 10 ft. of fill.

## Licking Creek Road Card Road 8444300 - Proposed





## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	ML
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8444300	2, 3	New Construction
<b>Begin Kilometer Post</b>	<b>Length</b>	<b>Begin Termini</b>
	<b>[kilometers (miles)]</b>	<b>(Kilometer Post)</b>
Road 8444300 begins at the intersection with Road 8444000 Kilometer Post 10.15.	0.290 km (0.18 mi)	0.000
		<b>End Termini</b>
		<b>(Kilometer Post)</b>
		0.290

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8444300

**Road Location:** Road begins at an intersection of Road 8444000, which will require reconstruction to access these units. Road accesses Unit 33. Road construction will be moderate to easy with low gradients. Road begins in a previously harvested area and is located through approximately 150 meters of second-growth timber. Road climbs at 15 percent through previously harvested area, enters unit and continues at 15 percent to a bench from which remainder of unit can be harvested. Location of road was done to avoid karst and other resource concerns.

**Wetlands:** No crossing of wetlands is anticipated. Should wetland areas be identified during final layout, the road will be modified to avoid or minimize effects on wetlands, and appropriate standards will be applied.

**Erosion Control:** An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** Road construction as designed will avoid karst concerns.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## **Road Management Objectives**

### **Stream Crossings**

#### **Road No. 8444300**

No streams are crossed on this new road location.



## Licking Creek Road Card Road 8446 (8446000) – Existing



- |                               |                           |
|-------------------------------|---------------------------|
| —●— Class I Stream            | — Selected Road           |
| —●●— Class II Stream          | ■ Wetland                 |
| —●●●— Class III Stream        | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream        | ■ Potential Slopes GT 65% |
| ++++ Unit Pool Boundary       | ■ Fresh or Salt Water     |
| — Existing Road               | 🦅 Eagle's Nest            |
| □□□ To Be Built Road          |                           |
| □□□ Reconstruct Existing Road |                           |
| □□□ Proposed Project Road     |                           |

Status - Existing

Contour Interval 200 Feet

Mapscale 1: 38913

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b>	<b>System</b>	<b>Land Use Designation</b>
Licking Creek	Licking Creek	TP
<b>Route No.</b>	<b>In Alternatives</b>	<b>Status</b>
8446000	2, 3, 4, 5	Existing
<b>Begin Kilometer Post</b>	<b>Length [kilometers (miles)]</b>	<b>Begin Termini (Kilometer Post)</b>
Road 8446000 intersects Road 8400000 at Kilometer Post 61.05	Alt 4: 8.86 km (5.50 mi)  Alts 2,3,5: 12.501 km (7.77 mi)	0.000  0.000
		<b>End Termini (Kilometer Post)</b>
		8.86 (Alt 4)  12.501 (Alts 2,3,5)

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
C	Short Term	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 2

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Open

**Travel Management Strategies:**

Encourage:	NA
Accept:	High-clearance vehicles
Discourage:	NA
Prohibit:	NA
Eliminate	NA

**Travel Management Narrative:** Road will remain open for Forest Service administrative activities. Road will have maintenance on a scheduled time frame to preserve the resources accessed by this road.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8446000

**Road Location:** This is an existing road. The road is presently grown over with alder and will require brushing. Road is calving off in places and will require replacement of borrow excavation. Slides have occurred in past years and will require removal. Road will require prism reestablishment, ditchline cleaning, and seeding. Road reconstruction will address all soils/water concerns.

**Wetlands:** Road management along existing Road 8446000 that crosses wetlands and requires road maintenance will not further impact wetlands and will not change the existing footprint.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during maintenance shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is an existing road needing pre-haul maintenance. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during reconstruction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Existing rock pits will be used for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Pre-haul maintenance will correct the following conditions. Ditch is plugged with limbs/slash/snags/rootwad/blowdown at Mileposts 0.32, 1.13, 3.01, 3.43, 3.66, 5.33, and 5.67. Rockslides are plugging ditch at Mileposts 0.90, 1.15, 1.45, 2.06 and 6.85. There is a shallow ditch at Mileposts 0.37, 1.5, 2.3, 5.07 and 5.43. Slides are blocking at least some portion of the road at Mileposts 2.04, 2.75, 3.51, 3.74, 5.00, and 7.02. Rockslide exists at Milepost 5.81. Small slides exist between Mileposts 7.04 and 7.56, as well as 3.53. Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following reconstruction (BMPs 12.17 and 14.8).

**Silviculture:** Keep road open to ensure access to units until they are certified as stocked as required by NFMA.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



## Road Management Objectives

### Stream Crossings

#### Road No. 8446000

- A.) M.P. .0662** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 7.8' Substrate: Boulder Cobble  
Gradient Upstream: 65 Gradient Downstream: 44 Structure: CP Passage required: No Timing Dates: N/A
- B.) M.P. 1.026** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 7.0' Substrate: Boulder Cobble  
Gradient Upstream: 41 Gradient Downstream: 65 Structure: CP Passage required: No Timing Dates: N/A
- C.) M.P. 1.210** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 5.4' Substrate: Cobble Bedrock  
Gradient Upstream: 55 Gradient Downstream: 61 Structure: CP Passage required: No Timing Dates: N/A
- D.) M.P. 1.400** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 4.5' Substrate: Bedrock  
Gradient Upstream: 55 Gradient Downstream: 95 Structure: CP Passage required: No Timing Dates: N/A
- E.) M.P. 3.467** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.8' Substrate: Bedrock  
Gradient Upstream: 50 Gradient Downstream: 44 Structure: CP Passage required: No Timing Dates: N/A
- F.) M.P. 3.608** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 2.8' Substrate: Bedrock  
Gradient Upstream: 33 Gradient Downstream: 35 Structure: CP Passage required: No Timing Dates: N/A
- G.) M.P. 3.624** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 2.8' Substrate: Bedrock  
Gradient Upstream: 36 Gradient Downstream: 40 Structure: CP Passage required: No Timing Dates: N/A
- H.) M.P. 3.652** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 2.5' Substrate: Bedrock  
Gradient Upstream: 38 Gradient Downstream: 44 Structure: CP Passage required: No Timing Dates: N/A
- I.) M.P. 3.835** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.0' Substrate: Boulder Cobble  
Gradient Upstream: 50 Gradient Downstream: 55 Structure: CP Passage required: No Timing Dates: N/A
- J.) M.P. 4.008** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.8' Substrate: Boulder Gravel  
Gradient Upstream: 75 Gradient Downstream: 42 Structure: CP Passage required: No Timing Dates: N/A
- K.) M.P. 4.043** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.5' Substrate: Boulder Cobble  
Gradient Upstream: 62 Gradient Downstream: 36 Structure: CP Passage required: No Timing Dates: N/A
- L.) M.P. 4.110** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.5' Substrate: Gravel Cobble  
Gradient Upstream: 54 Gradient Downstream: 42 Structure: CP Passage required: No Timing Dates: N/A
- M.) M.P. 4.163** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.5' Substrate: Boulder Cobble  
Gradient Upstream: 37 Gradient Downstream: 38 Structure: CP Passage required: No Timing Dates: N/A
- N.) M.P. 4.318** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.1' Substrate: Cobble Gravel  
Gradient Upstream: 42 Gradient Downstream: 19 Structure: CP Passage required: No Timing Dates: N/A
- O.) M.P. 4.384** AHMU: Class II Channel Type: MM1 Channel Bedwidth: 21.1' Substrate: Cobble Gravel  
Gradient Upstream: 5 Gradient Downstream: 5 Structure: CP Passage required: No Timing Dates: N/A  
**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.
- P.) M.P. 4.415** AHMU: Class II Channel Type: MM1 Channel Bedwidth: 21.1' Substrate: Cobble Gravel  
Gradient Upstream: 5 Gradient Downstream: 5 Structure: CP Passage required: No Timing Dates: N/A  
**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

## Appendix B

**Q.) M.P. 4.492** AHMU: Class II Channel Type: MM1 Channel Bedwidth: 18.3' Substrate: Cobble Gravel  
Gradient Upstream: 4 Gradient Downstream: 6 Structure: CP Passage required: No Timing Dates: N/A  
**Narrative:** The Forest Service will conduct an Upstream Assessment at this site in 2002.

**R.) M.P. 4.684** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.3' Substrate: Cobble Gravel  
Gradient Upstream: 34 Gradient Downstream: 21 Structure: CP Passage required: No Timing Dates: N/A

**S.) M.P. 4.991** AHMU: Class III Channel Type: HC5 Channel Bedwidth: 4.5' Substrate: Bedrock  
Gradient Upstream: 74 Gradient Downstream: 53 Structure: CP Passage required: No Timing Dates: N/A

**T.) M.P. 5.658** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.0' Substrate: Bedrock  
Gradient Upstream: 85 Gradient Downstream: 54 Structure: CP Passage required: No Timing Dates: N/A

**U.) M.P. 7.232** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.5' Substrate: Bedrock  
Gradient Upstream: 46 Gradient Downstream: 32 Structure: CP Passage required: No Timing Dates: N/A

**V.) M.P. 7.480** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.6' Substrate: Bedrock  
Gradient Upstream: 42 Gradient Downstream: 36 Structure: CP Passage required: No Timing Dates: N/A

**W.) M.P. 7.611** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 2.8' Substrate: Cobble Gravel  
Gradient Upstream: 36 Gradient Downstream: 40 Structure: CP Passage required: No Timing Dates: N/A

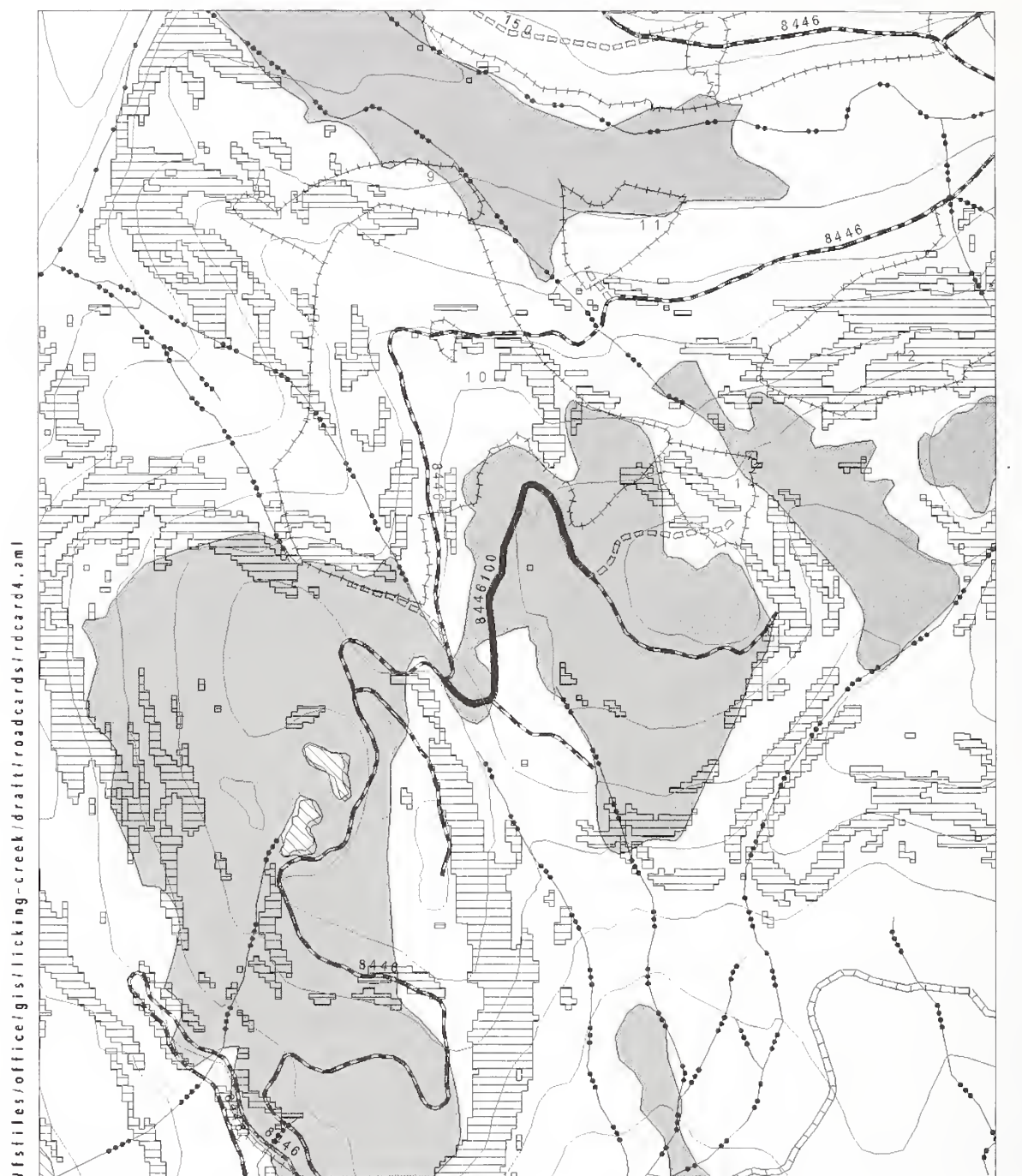
**X.) M.P. 7.633** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.1' Substrate: Bedrock  
Gradient Upstream: 23 Gradient Downstream: 38 Structure: CP Passage required: No Timing Dates: N/A

**Y.) M.P. 7.755** AHMU: Class IV Channel Type: HC5 Channel Bedwidth: 1.1' Substrate: Cobble Gravel  
Gradient Upstream: 75 Gradient Downstream: 19 Structure: CP Passage required: No Timing Dates: N/A

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## Licking Creek Road Card Road 8446100 – Existing



- |                             |                           |
|-----------------------------|---------------------------|
| —●— Class I Stream          | — Selected Road           |
| —●●— Class II Stream        | ■ Wetland                 |
| —●●●— Class III Stream      | ■ MM-Haz 4 Soil           |
| —●●●●— Class IV Stream      | ■ Potential Slopes GT 65% |
| ++++ Unit Pool Boundary     | ■ Fresh or Salt Water     |
| — Existing Road             | — Eagle's Nest            |
| — To Be Built Road          |                           |
| — Reconstruct Existing Road |                           |
| — Proposed Project Road     |                           |

Status - Existing

Contour Interval 200 Feet

Mapscale 1: 12612

0 0.2 0.4 Miles

Note: Compiled from various digital geographic data.  
This map may not meet National Map accuracy standards.

## Road Management Objectives

<b>Project/EIS</b> Licking Creek <b>Route No.</b> 8446100 <b>Begin Kilometer Post</b> Road 8446100 begins at the intersection with Road 8446000 at Kilometer Post 4.578	<b>System</b> Licking Creek <b>In Alternatives</b> 2, 3, 5 <b>Length</b> <b>[kilometers (miles)]</b> 0.88 km (0.55 mi)	<b>Land Use Designation</b> TP <b>Status</b> Existing <b>Begin Termini</b> <b>(Kilometer Post)</b> 0.000 <b>End Termini</b> <b>(Kilometer Post)</b> 0.886
---	--	--

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Lowboy	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_

**Date:** \_\_\_\_\_

# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8446100

**Road Location:** This is an existing road. Road will require a minimal amount of maintenance to prepare road for use. During pre-haul maintenance, soils/water concerns will be addressed.

**Wetlands:** Road management along existing Road 8446100 that crosses wetlands and requires road maintenance will not further impact wetlands and will not change the existing footprint.

**Erosion Control:** An erosion control plan for maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during maintenance shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is an existing road needing pre-haul maintenance. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during reconstruction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Existing rock pits are located for the most economical haul and least impacts to other resources.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Pre-haul maintenance will correct the following: at Milepost 0.27, there are two logs in the ditch. At Milepost 0.30, there is a rockslide in the ditch. At Milepost 0.78, the right shoulder of the road is sliding off. Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Keep road open for at least 3 years following harvest as to ensure access to units until they are certified as stocked as required by NFMA.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.



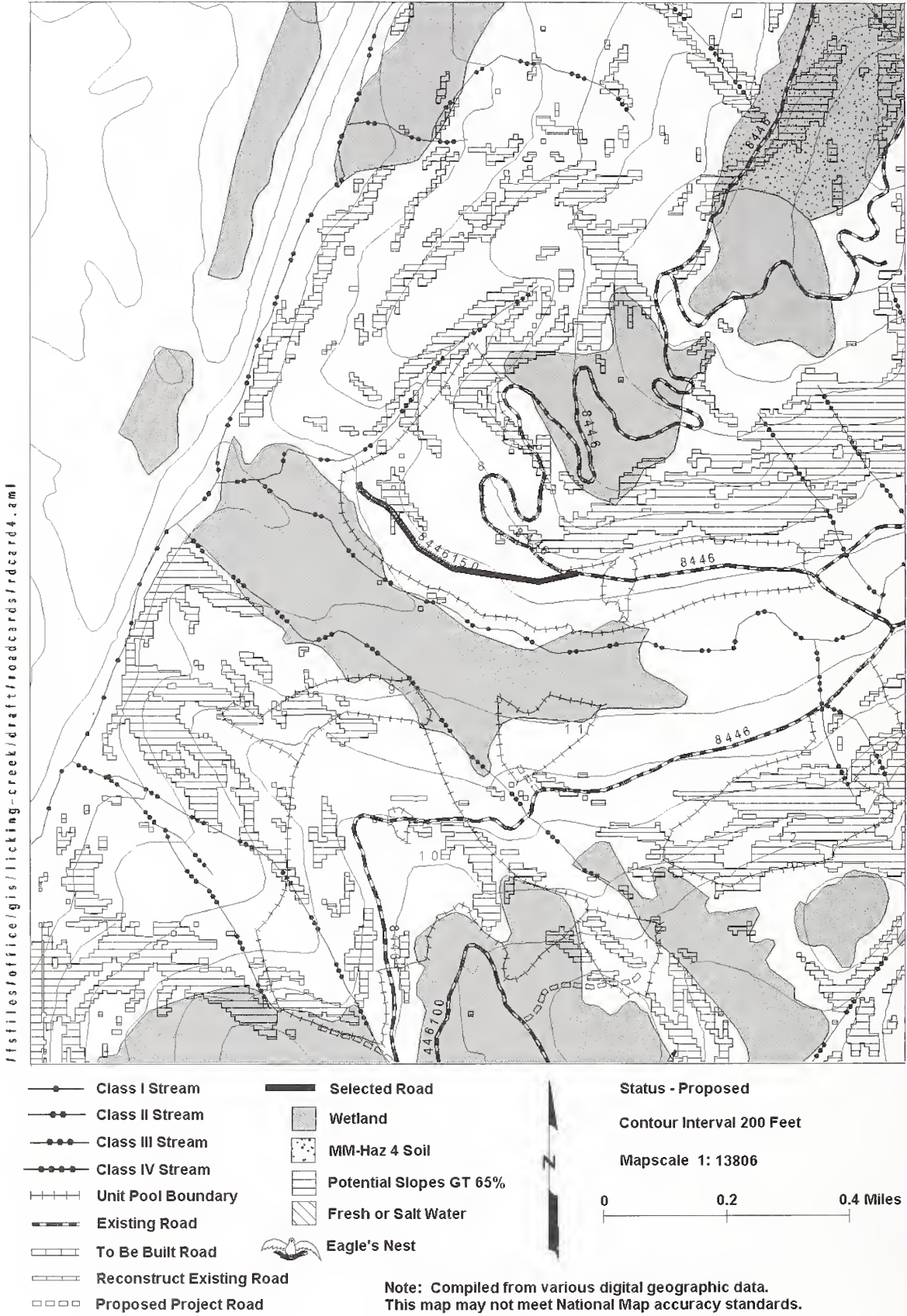
## **Road Management Objectives**

### **Stream Crossings**

#### **Road No. 8446100**

No streams are crossed on this existing road location.

Licking Creek Road Card  
Road 8446150 - Proposed



## Road Management Objectives

<b>Project/EIS</b> Licking Creek	<b>System</b> Licking Creek	<b>Land Use Designation</b> TP
<b>Route No.</b> 8446150	<b>In Alternatives</b> 4	<b>Status</b> New construction
<b>Begin Kilometer Post</b>  Road begins at Kilometer Post 9.068 Road 8446000	<b>Length</b> <b>[kilometers (miles)]</b> 0.673 km (0.42 mi)	<b>Begin Termini</b> <b>(Kilometer Post)</b> 0.000
		<b>End Termini</b> <b>(Kilometer Post)</b> 0.673

### General Design Criteria and Elements

<b>Functional Class</b>	<b>Service Life</b>	<b>Traffic Service Level</b>	<b>Surface</b>	<b>Width</b>	<b>Critical Vehicle</b>	<b>Design Vehicle</b>	<b>Design Speed</b>
L	LI	D	Rock	4.3 m	Log truck	Log truck	15 kph

**Intended Purpose/Future Use:** Use includes silvicultural activities.

### Maintenance Criteria

**Operational Maintenance Level:** 2

**Objective Maintenance Level:** 1

**Maintenance Narrative:**

### Operation Criteria

**Highway Safety Act:** No

**Jurisdiction:** National Forest System

**AFRPR Status:** Closed

**Travel Management Strategies:**

Encourage:	NA
Accept:	Hikers, bicycles, ORVs
Discourage:	NA
Prohibit:	NA
Eliminate	Vehicle traffic

**Travel Management Narrative:** Remove all drainage structures upon completion of silvicultural activities. Water bar and grass seed entire roadway.

**District Ranger Approval (signature):** \_\_\_\_\_ **Date:** \_\_\_\_\_



# Road Management Objectives

## Site-Specific Design Criteria

### Road No. 8446150

**Road Location:** Road accesses Unit 8. Road is located completely within the unit and construction should be moderate over most portions of the road. Road is located to accommodate logging systems and still have the least impact on other resources. There are no sections where road location crosses steep slopes over 67 percent, but in areas where road is in rock or where full bench construction will be required, end hauling of excavated material may be warranted.

**Wetlands:** No crossing of wetlands is anticipated. Should wetland areas be identified during final layout, the road will be modified to avoid or minimize effects on wetlands, and appropriate standards will be applied.

**Erosion Control:** An erosion control plan for construction and maintenance will be developed by the contractor and approved by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.17 and 14.8). This is new road construction. The recommendations referred to in the Resource Information, BMPs 12.5, 12.17, and 14.8, are to be followed. In addition, during construction, Controlled Excavation and Side Cast (BMP 14.12) and Drainage Control Structures to Minimize Erosion and Sedimentation (BMP 14.9) will be followed.

**Rock Pits:** Rock pits will be located for the most economical haul and least impacts to other resources. Rock pits will be approximately 1 mile apart; specific locations will be determined during final road layout.

#### **Resource Information (If applicable):**

**Timber/Logging:** No resource concerns were identified.

**Soils/Water:** Avoid the placement of fill material or the side casting of waste material on steep, potentially unstable slopes (BMPs 14.7 and 14.9). Provide cross drains where needed to provide for the passage of surface water and aquatic organisms (BMP 12.5). Erosion control seeding of cutbanks and fill slopes should be implemented as soon as possible following construction (BMPs 12.17 and 14.8).

**Silviculture:** Maintaining the road as open is not necessary to fulfill silvicultural needs.

**Wildlife/Botany:** No resource concerns were identified.

**Lands/Minerals/Geology/Karst:** No resource concerns were identified.

**Recreation/Scenery:** No resource concerns were identified.

**Heritage Resources:** No resource concerns were identified.

## Road Management Objectives

### Stream Crossings

#### Road No. 8446150

No streams are crossed on this new road location.



Log loading at barge-accessible LTF; photo by Eric Trimble



# **Appendix C**

## **Visual Simulations**



# Appendix C

## Visual Simulations

To help the viewer visualize the impacts of harvest on National Forest lands on the Licking Creek project area, photographs were taken from various viewpoints in Carroll Inlet. These photographs were then scanned into the computer. Adobe Photoshop, a photo-editing tool, was used to draw the approximate size and location of units visible from a given viewpoint. The residual stands resulting from harvest were simulated based on specific silvicultural prescriptions such as percentage of trees retained, size of group selections and other direction. The simulations were also based on observations of some of the limited uneven-aged harvest that has occurred on the Forest and some knowledge of what different levels of retention within a unit look like.

This appendix displays the visual simulations from three viewpoints. The simulations show how a given unit could look after harvest from each viewpoint. Actual on-the-ground situations such as slope, location of reserve trees, streams and topography, size of trees and the species component of the unit could cause the units to look slightly different after harvest.

Each visual simulation viewpoint shows the Existing Condition, the expected condition after the Madder Timber Sale (already sold) units are harvested, and the expected condition with both the Madder units and the Licking Creek units harvested. The Licking Creek simulations show the "maximum harvest" alternative for that particular viewpoint - Alt. 3 from Viewpoint 1, and Alt. 4 from Viewpoints 2 and 3. Other alternatives not shown for each viewpoint would in fact create less visual impact than shown. The viewpoint locations are shown on Figure C-1.

### Notes on photo-simulations:

Viewpoint 1, Fig. C-2: Illustrates existing condition

Viewpoint 1, Fig. C-3: Alternative 3, Units 9, 10, and 12; Unit 12 is not in Alternative 4

Viewpoint 2a, Fig. C-4: Illustrates existing condition

Viewpoint 2a, Fig. C-5: Existing condition including Madder units harvested

Viewpoint 2a, Fig. C-6: Simulates condition with Madder units and Licking Alt. 4, Units 19, 24, and 43 harvested

Viewpoint 2b, Fig. C-7: Illustrates existing condition

Viewpoint 2b, Fig. C-8: Existing condition including Madder unit harvested

Viewpoint 2b, Fig. C-9: Simulates condition with Madder unit and Licking Alt. 4, Units 40, 44, 63, 67, and 71 harvested

Viewpoint 3a, Fig. C-10: Illustrates existing condition

Viewpoint 3a, Fig. C-11: Existing condition including Madder units harvested

Viewpoint 3a, Fig. C-12: Simulates condition with Madder units and Licking Alt. 4, Units 40, 43, and 50 harvested

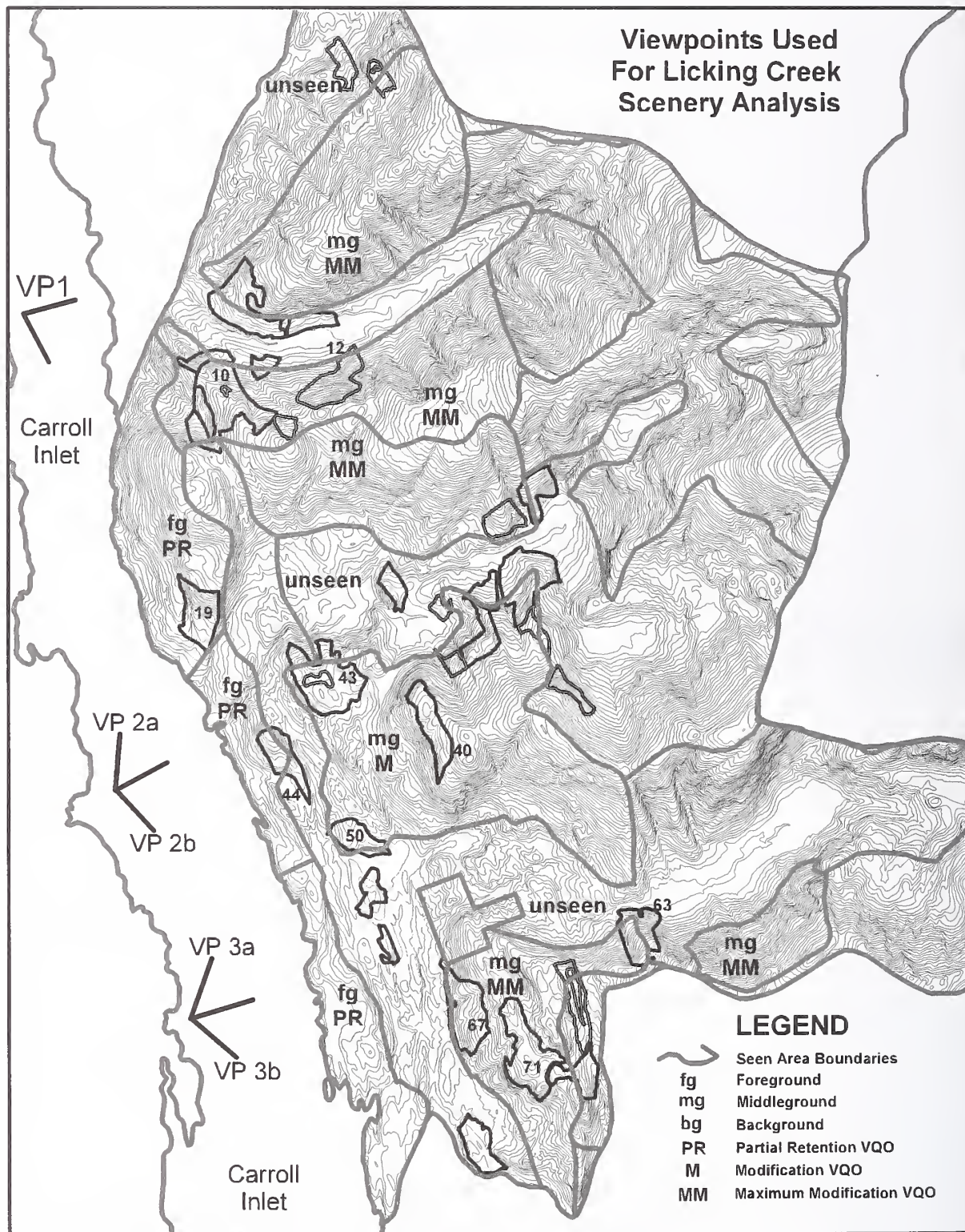
Viewpoint 3b, Fig. C-13: Illustrates existing condition

Viewpoint 3b, Fig. C-14: Existing condition including Madder unit harvested

Viewpoint 3b, Fig. C-15: Simulates condition with Madder unit and Licking Alt. 4, Units 67 and 71 harvested



Figure C-1  
Licking Creek Project Viewpoint (VP) Locations



Source: GIS, J. Short, 2002

Viewpoint 1 – Existing Condition

Fig. C-2



Viewpoint 1 – Alternatives 3 and 5 Proposal

Fig. C-3





## Appendix C

Viewpoint 2a – Existing Condition

Fig. C-4



Viewpoint 2a – Existing Condition Including Madder Units

Fig. C-5



Viewpoint 2a – Madder Units and Alternative 4 Proposal

Fig. C-6





Viewpoint 2b – Existing Condition

Fig. C-7



Viewpoint 2b – Existing Condition Including Madder Unit

Fig. C-8



Viewpoint 2b – Madder Unit and Alternatives 4 and 5 Proposal

Fig. C-9



# Appendix C

**Viewpoint 3a – Existing Condition**

**Fig. C-10**



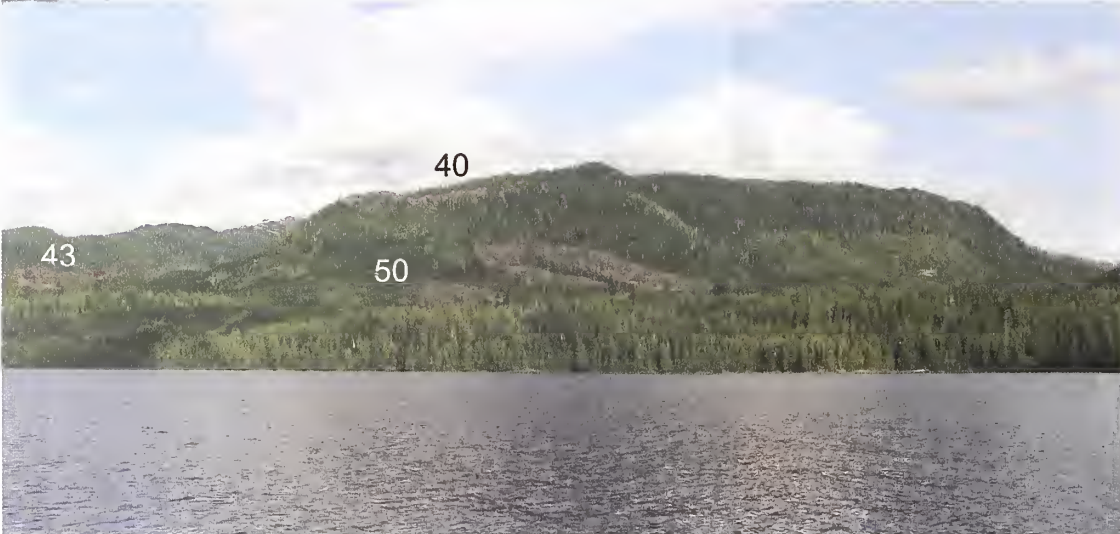
**Viewpoint 3a – Existing Condition Including Madder Units**

**Fig. C-11**



**Viewpoint 3a – Madder Units and Alternative 4 Proposal**

**Fig. C-12**





**Viewpoint 3b – Existing Condition**

**Fig. C-13**



**Viewpoint 3b – Existing Condition Including Madder Unit**

**Fig. C-14**



**Viewpoint 3b – Madder Unit and Alternatives 4 and 5 Proposal**

**Fig. C-15**







Calamity Creek; photo by Ricardo Sainz



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